

TWO COMMON ERRORS ABOUT THE PROPORTIONS OF THE 'ŪD: *Ibn a-ṭ-Ṭaḥḥān* and *al-Kindī*¹

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Introduction

The 'ūd and the *ṭunbūr* are generically called 'lutes' in archaeomusicology. This leads to persistent misunderstandings about the origins of both instruments. They are, as far as we know, distinct in their origins as well as in their organology. They should be referred to as 'lute-types', for reasons that I shall give below. Whenever the term 'lute' is used in the context of archaeomusicology, it implies that it is a 'lute-type'². The terms are used to distinguish chordophones where each string generates more than one pitch, when stopped with a finger on the neck of the instrument, from instruments where one string generates only one pitch, such as harps, lyres, and the like.

Other errors are frequently encountered in the literature and are generally the result of a lack of methodology, of philology, or simply of musicological, or (and mostly) of musical and practical knowledge. Other reasons are ideological. It has been common, in the last two centuries, to bring all back to Pythagoras as the source of scientific evidence for ancient music. This school of thought, even if it has produced multiple generations of musicologists, does not satisfy the epistemology of an objective and independent scholar.

On the other hand, the 'ūd as we know it in its current form since the eleventh century, due to various, principally ideological considerations, has been the catalyst of most of the organological errors and arbitrary postulations³.

In the present paper, we shall explore mainly two obvious errors about the instrument. The first one being Farmer's description of *a-ṭ-Ṭaḥḥān*'s 'archlute', of great importance because it reveals the careless attitude of Orientalist musicology towards scientific truth. The second is Poché's so-called hemispherical body of *al-Kindī*'s 'ūd'. Both errors are extremely misleading especially because of their wide repute in the literature⁴.

Ibn a-ṭ-Ṭaḥḥān's⁵ archlute according to Farmer

In 1939, Henry George Farmer⁶ described an archlute which would have been 180 cm tall. It would have been designed by *Abū-l-Ḥassan ibn a-ṭ-Ṭaḥḥān*, a musician from Fatimid Egypt. In 1979, Curtis Bouterse⁷ corrected Farmer's assumption on the basis of logic. *A-ṭ-Ṭaḥḥān*'s lute was brought back to a more reasonable size, closer to modern proportions. However, the misinterpretation persisted for forty years during which musicologists were amazed at the size of this instrument, without disputing Farmer's description. In the first part of this article, the proportions of the instrument, and the philological evidence will be discussed.

A-ṭ-Ṭaḥḥān's description of the 'ūd

A-ṭ-Ṭaḥḥān's explanations and Farmer's interpretation are given below:

"The dimension of the lute should be as follows: its length should be 180 cm. (= 40 *aṣābi'* *maḍmūma*). Its width should be 72 cm. (= 16 *aṣābi'* *maḍmūma*). Its depth should be 27 cm. (= 12 *aṣābi'* *maḍmūma*). The bridge-tailpiece^(sic) should be placed at about 4½ cm. (= 2 *aṣābi'* odd) [from the bottom]. The neck should be 29.25 cm long. (= 1 *shibr* + 1 'aqd in length). The pegbox should be 29.25 cm. The pegs should be eight unless there is a *zīr ḥādd* string when there will be ten strings, but this is not known in our times⁸."

The Arabic text in the *IfGAI* edition is⁹:

ص. 172، مخطوط ص. 87ظ:
فَأَمَّا كَمِيَّتَهُ فَيَحْتَاجُ أَنْ يَكُونَ طَوْلُهُ أَرْبَعُونَ أَصْبَعًا بِالأَصَابِعِ
المضمومة وعرضه ستة عشر أصبعًا¹⁰ بالأصابع
المضمومة أيضًا وعمقه اثني عشر أصبعًا وتركيب¹¹ المشط
منه على أصبعين وكسر وتقدير عنقه¹² الذي يركب عليه
شبر واحد وعقد ويكون طول بنجكه شبر وعقد وعدد ملاويه
ثمانية فإن كان له زير حاد ف عشرة وإن كان ذلك لا يعرف
في زماننا هذا

If we take the *işba'* as basic unit of measurement, equating to about the thickness of a finger of 2.25 cm, the (*işba'*) *maḍmūm*, according to Farmer would equate to two fingers, that is 4.5 cm. The *shibr* would be 12 fingers therefore 27 cm.

The linguistic and organological problem which arises comes from the meaning of *işba'* *maḍmūm*. The verb *ḍamma* means 'to join', *maḍmūm*, or *munḍamm* meaning 'joined' or 'tightened'. However, a finger cannot be joined to itself even if two or more of them can be pressed one against the other¹³. If we go back to the measurements given above we note that the terms used are *aşābi' maḍmūma*, the plural of (one) *işba'* *maḍmūm*¹⁴ which was also used by Farmer in the same article¹⁵. This expression is also found in an equivalent formulation as *aşābi' munḍamma* in *al-Kindī's* (epistle) *Risāla fi-l-Luḥūn wa-n-Nagham*, an incomplete version commented by Farmer. *Al-Kindī* says:¹⁶ '...to start with, the 'ūd must be 36 *işba'an munḍamma* - thick fingers! This would amount to three *ashbār*'¹⁷.

In this quotation, *işba'an* is a flexion of the word *işba'* when it follows a number, here 36. We can therefore agree that the *shibr* is equal to 12 'joined fingers' and that *munḍam[ma]* joined to *işba'an* or *aşābi'* means 'joined without gaps'... to differentiate this unit of measurement from the *shibr* where the fingers are separated.¹⁸

Additionally, the 'aqd is a particular Arabian value which in context equates to a 'unit' (1) or to 'tens' (10)¹⁹ which would correspond, in the first meaning of the term to Farmer's interpretation where he writes that (1 *shibr* + 1 'aqd = 13 fingers).

Having corrected Farmer's figures to a formulation proportional to the total length *L* of the instrument, we have two possible measurements whether the length of the pegbox is included or excluded in its total length²⁰.

Should we subtract the pegbox from the total length, *Ṭaḥḥān's* measurements would be:

1. Total length without pegbox = 27 fingers = L
2. Total width = 16 fingers = $16L/27$
3. Total depth = 12 fingers = $12L/27$
4. Neck = 13 fingers = $13L/27$
5. Saddlebridge position: at about 2 fingers = $L/16$ from the bottom.
6. Length of the pegbox = 13 fingers = $13L/32$
7. Length of the soundbox = 14 fingers = $7L/16$
8. Total speaking length, more or less 25 fingers = $25L/27$
9. Speaking length above soundboard = 12 fingers = $12L/27$
10. Soundbox: width/length = $16/14 = 8/7$; depth/width = $3/4$

The proportions of the soundbox would be such that in this case, the width would be greater than the length, and therefore *Ṭaḥḥān's* 'ūd would be more like a *ṭunbūr* the speaking length of which, above the neck, (13 fingers) would be longer than the speaking length above the soundboard (12 fingers). Therefore this hypothesis is to be rejected.

Should the pegbox length be added to the total length *L* (without pegbox), *Ṭaḥḥān's* 'ūd proportions would then be (Fig. 1):

1. Total length without pegbox = 40 fingers = L
2. Total width = 16 fingers = $2L/5$
3. Total depth = 12 fingers = $3L/10$
4. Neck = 13 fingers = $13L/40$
5. Position of the bridge: About 2 fingers (+) = $L/20$ from the bottom
6. Total speaking length = 38 fingers = $19L/20$
7. Length of the soundbox = 27 fingers = $27L/40$ with more or less $2L/3$
8. Total speaking length, above soundboard = more or less 25 fingers = $5L/8$
9. Soundbox: width/length = $16/27$; depth/width = $3/4$
10. Length of pegbox = 13 fingers = $13L/40$ (additionally)

These figures having been corrected, the size of Farmer's 'mega-'ūd' has been reduced to more acceptable proportions with a maximal length

of 90 cm, a width of 36 cm a depth of 27 cm with the bridge placed at 4.5 cm from the lower extremity²¹ and a neck 30 cm long. Since we are aware that Farmer's estimation of the finger was oversized and that anthropometric measurements would have increased during the past centuries, it would appear reasonable to 'guess-timate' an average finger at 2 cm which would bring back *Ṭaḥḥān*'s 'ūd measurements as follows:

1. Total length: 80 cm
2. Total width: 32 cm
3. Total depth: 24 cm
4. Neck: 26 cm
5. Position of the bridge at approximately 4.5 cm from the lower end of the instrument
6. Total speaking length: approximately 75.5cm
7. Speaking length above soundboard: approx. 49.5cm
8. Pegbox: 26 cm

Since we know that both ancient and modern 'ūds are described²² as having speaking lengths approximately three times the length of the neck, (the junction of the neck and the soundbox equating to a just fifth, that is a third of the speaking length, measured from the nut) *Ṭaḥḥān*'s measurements bring up a problem. Indeed, if the total length in the previous table excludes the pegbox, the speaking length measured above the neck (26 cm), is almost an exact third of the whole speaking length ($75.5/3 = 25.17$).

Should we rely on Farmer's initial proportions, the problem is increased since the neck measures $\{(29,25/[180-4,5]) = 0,1666666...\}$ of the speaking length. This would reduce each string span (over the neck) by a wide tone and a half (342 cents to be precise) and would be in opposition to all Arabian anterior and posterior descriptions of the 'ūd (and of its neck). Proportions being corrected, should the pegbox be included in the total length, the soundbox and the neck would only amount to 54 cm with a total speaking length equal to 49.5 cm, of which over one half (26 cm) would be the speaking length of the string above the neck. This would almost describe a *ṭunbūr*²³ rather than an 'ūd.

Notwithstanding, therefore, that the bridge would be greatly displaced towards the lower part of the instrument and that the speaking length of the string, above the neck would

measure slightly more than a third of the whole speaking length. Thus it would appear that a comparison between the 'ūds described by *Ṭaḥḥān* and *Kāmil al-Khulāṭī*'s (Figs. 2 and 3), a musician and author living in the early part of the twentieth century, that the instrument would have almost acquired its definitive proportions quite early and that evolutions would have been restricted, up to now, only with regard its classical versions.

The 'archlute' in *Kanz a-t-Tuḥaf*

It will be instructive to compare *Ṭaḥḥān*'s 'ūd to a second description of an 'archlute' given by Farmer in the same article [p. 48]. Thankfully, Farmer's proportions of the 'ūd in the *Kanz a-t-Tuḥaf* are in their almost original figures²⁵:

'As for the dimensions of the lute the length should be 162 cm. (= 36 *angusht*²⁶ *munḍam*), the width 33.75 cm. (= 15 *angusht*), and the depth 16.875 cm. (= 7½ *angusht*). The measurement of the bridge-tailpiece_(sic) should be 13.5 cm. (= 6 *angusht*) [...] The length of the neck should be a quarter of the length of the lute ...'²⁷.

These proportions after corrections and the hypothesis that the bridge would have been placed where it meets with the strings (first hypothesis), would agree with figure 4:

1. Total length = 36 fingers = L
2. Total width = 15 fingers = $5L/12$
3. Total depth = 7.5 fingers = $5L/24$
4. Length of the soundbox = 27 fingers = $3L/4$
5. Neck = $L/4$ (9 fingers)
6. Position of the bridge: 6 fingers away from the lower end = $L/6$
7. Total speaking length = 30 fingers = $5L/6$
8. Speaking length above the soundboard = 21 fingers = $7L/12$
9. Soundbox width/length = $15/27 = 5/9$; Depth/width = $1/2$

Here again, proper units of measurement must be integrated in which case the 'ūd described in the *Kanz a-t-Tuḥaf* would have had the following:

1. Total length: 72 cm
2. Total width: 30 cm
3. Depth of soundbox: 15 cm
4. Position of the bridge: at 12 cm from the bottom
5. Speaking length: $72 - 12 = 60$ cm
6. Length of the neck: 18 cm

For a second hypothesis, it would suffice

that the distance to the bridge be measured from the lower end of the instrument and that its width would be of 3 fingers (which is organologically possible, although improbable) so that the ratio between the neck and the speaking length of the string would be 1:3. In this case with a bridge of 3 fingers in width, the base of which placed at 6 fingers from the lower end of the instrument, would give the following (Fig. 5):

1. Total length = 36 fingers = L
2. Total width = 15 fingers = $5L/12$
3. Total depth = 7.5 fingers = $5L/24$
4. Neck = $L/4$ (9 fingers)
5. Soundbox length = 27 fingers = $3L/4$
6. Junction of the strings with the bridge at 9 fingers from the lower end of the instrument = $L/4$ from the lower end (second hypothesis)
7. Total speaking length = 27 fingers = $3L/4$
8. Speaking length above the soundboard = 18 fingers = $L/2$
9. Soundbox: width/length = $15/27 = 5/9$; depth/width = $1/2$

These proportions are closer to *Kindī's* 'ūd as we shall demonstrate in the second part of this paper with, however, an overgrown bridge displaced towards the nut²⁹.

We shall come back to this description after having read *Kindī's* 'ūd proportions in the *New Grove* description and according to the original Arabic text. Our first conclusions will have proven that 1) all proportions of these ancient 'ūds are close enough to the modern instrument, with a well-rounded soundbox, and 2) that the least which can be said is that Farmer has completely ignored coherence in his argumentation³⁰.

Al-Kindī's hemispherical soundbox 'ūd:

Christian Poché's *New Grove* description

We were astonished as we read the *New Grove* article³¹ about the 'ūd. Its author mentioned an 'ūd with an hemispherical soundbox which would have been described by *Kindī* in the ninth century³². Having just completed an in-depth re-reading of all the available writings of *Kindī*, Poché's postulation appeared to us as strange with potentially considerable consequences on early theory, and praxis. I quote:

'The body has evolved considerably from the original pear shape (which is perpetuated in our own time with the *qanbūs*, taking on a swelling, rounded form). A spherical

shape may even have been envisaged: *al-Kindī* (9th century) described the body of the lute as a ball divided in two.'

We must admit that this description appeared rather puzzling. For our own research, we had come to the conclusion that the measures given by *Kindī* were coherent and corresponded to the usual shape of the instrument, as we know it today. Furthermore, Poché insists that the 'ūd would have evolved from a pear-shaped instrument since about 1920, and adds:

'The Syrian *Nahhāt* [should be written "*Naḥḥāt*"] dynasty, originally from Greece, settled in Damascus at the end of the 19th century, and signed their instruments with the name of *Ikhwān Nahhāt* (the *Nahhāt* brothers). The first generation was active in the 1920s and consisted of four brothers, *Hannā* [should be written "*Ḥannā*"], *Antūn* [should be written "*Anṭūn*"], *Rūfān* and 'Abduḥ *Nahhāt*; the second generation comprised *Hannā's* two sons *Tawfīq* and *Jurjī*, and the dynasty came to an end with *Tawfīq's* death in 1946. The *Nahhāt* family, who worked on a small scale as craftsmen, not on the industrial scale usual today, transformed the 'ūd by giving it its pear shape ('ūd *ijjās*, or in dialect 'ūd *njās*), and produced extraordinary instruments through their research into the sonority of wood.'

It was therefore most interesting to come back to the aforementioned description as well as that given by the *Ikhwān a-ṣ-Ṣafā'*, which are both quoted in Poché's article in which he says, literally, that the proportions described by the latter were 'harmonious'³⁵, and in which is given the hypothesis that the 'ūd might have evolved from a pear shape, at the dawn of its Arabian history, and then adopted an hemispheric soundbox to end-up with 'harmonious' proportions towards the tenth century (with the *Ikhwān a-ṣ-Ṣafā'*) and then turned back to a (half) pear-shaped, exclusively from the twentieth century.

Al-Kindī's original description and explanations

Looking back at *Kindī's* epistles compiled by *Yūsuf*³⁶, which he later re-edited³⁷, and further cross-examining it with the *Risāla fī Khubr Ṣinā'at a-t-Ta'līf*, edited and commented by *Shawqī*³⁸, we have found the following detailed description in the *Risāla fī-l-Luḥūn wa-n-Nagham*, (which in the *New Grove* is only vaguely reproduced):

'[and the] length [of the 'ūd] will be: thirty-six joint fingers - with good thick fingers - and the total will amount to three *ashbār*³⁹. And its width: fifteen fingers. And its depth seven and a half fingers. And the measurement of the width of the bridge with the remainder behind: six fingers. Remains the length of the strings: thirty fingers and on these strings take place the division and the partition, because it is the sounding [or "the speaking"] length. This is why the width must be [of] fifteen fingers as it is the half of this length. Similarly for the depth, seven fingers and a half and this is the half of the width and the quarter of the length [of the strings]. And the neck must be one third of the length [of the speaking strings] and it is: ten fingers. Remains the vibrating body: twenty fingers. And that the back (soundbox) be well rounded and its "thinning" (*khart*)⁴⁰ [must be done] towards the neck, as if it had been a round body drawn with a compass which was cut in two in order to extract two 'ūds⁴¹.'

Kindī adds complementary information further below in his text (see also figure 15):

'Then they adopted (*ṣayyarū*) the ratio which is after the third [of the length of the strings] - and it is the half - for the width and it is the largest width it must be, and its position on the 'ūd must be three fingers away from the end of the bridge in the direction of the [following the *ilā mā yalī*] strings [width of the bridge = 3 - 7,5 + 6 = 1.5 fingers] - (see figure 15), and the reason for this [is] that it is placed along [*'bi-muḥādhāt*' = at the proximity of] the place where the strings are plucked, and this because this emplacement [on the 'ūd] is the widest and the most perfectly sounding, and with regard the plucking of the strings, it is at three fingers from the [front of the] bridge [6 + 3 = 9 fingers from the bottom] because it is the position of one of the parts of the strings and it is its tenth⁴².'

A 'vibrating body' (the speaking length of the string above the soundboard) with length of 20 fingers corresponds to a soundbox 26 fingers long. With a width of 15 fingers, it will show that it is difficult to visualize this soundbox as being hemispherical. Here, *Kindī* is accurate in his description and insists on the fact that 'the back should be well-rounded' and must be 'thinned down' (*khart*) towards the neck to make a smooth junction with it. To resume, *Kindī*'s 'ūd proportions in this epistle are as follows: (fractions are given in relation to the total length *L*):

1. Total length: 36 fingers = L
2. Total width: 15 fingers = $10L/24 = 5L/12$
3. Total depth: 7.5 fingers = $5L/24$
4. Length: 10 fingers = $5L/18$
5. Soundbox length: 26 fingers = $13L/18$
6. Position of the bridge: 6 fingers from the lower end

$$= 4L/24 = L/6$$

$$7. \text{ Total speaking length: } 30 \text{ fingers} = 20L/24 = 5L/6$$

$$8. \text{ Speaking length above soundboard: } 20 \text{ fingers} = 5L/9$$

$$9. \text{ Optimal plucking point (from the lower end): } 9 \text{ fingers} = L/4$$

$$10. \text{ Soundbox: width/length} = 15/26, \text{ or around } 3/5; \text{ depth/width} = 1/2$$

Should the aforementioned description rightly suggests a soundbox with a hemispherical base, it proves that this box resembles contemporary instruments and that *Kindī*'s dimensions distanced themselves from the 'harmonious proportions'⁴³ of the 'ūd described, according to Poché, in his citation of the *Ikhwān a-ṣ-Ṣafā*:

'The length must be one and a half time the width; the depth, half the width; the neck, one quarter of the length⁴⁴.'

This description is short and so is the Arabic version we have in our possession which equally gives brief indications⁴⁵. As for *Kindī*'s 'ūd, the hypothesis of an hemispherical soundbox is simply absurd. If indeed the depth of the *end of the bridge in the direction of* is really 7.5 fingers, it is obvious that the length of the soundbox must be, if it were hemispherical, equal to the width (diameter) that is the double (15 fingers) of that depth (radius), which contradicts *Kindī*'s indications who clearly stated that the length of the soundboard which equals to the (total) length of the instrument, minus the length of the neck, is equal to 26 'fingers'. Figure 6 has a drawing of *Kindī*'s 'ūd according to his descriptions. The line which links the hemisphere which constitutes the soundbox (to the left in the drawing) to the neck can have a more or less elongated shape⁴⁶, the maximal width will be found at the height of the centre of the hemisphere inscribed in the box, and the maximal depth, at the vertical of the centre.

Regarding the description of the 'ūd given in the *Ikhwān a-ṣ-Ṣafā* (drawn to scale in figure 7, with the hypothesis of a rounded soundboard towards the neck), the proportions are:

1. Total length = L
2. Total width = $2L/3$
3. Total depth = $L/3$
4. Neck = $L/4$
5. Soundbox length = $3L/4$
6. Position and size of the bridge are not given.
7. Total speaking length, speaking length above the soundboard, etc., dimensions not given.
8. Soundbox: width/length = $8/9$; depth/width = $1/2$

Comparing both diagrams, we can derive that:

1. The 'ūd in the *Ikhwān a-ṣ-Ṣafā'* is structurally comparable to *Kindī's* and circumscribes a sphere the radius of which would be equal to its depth.
2. *Kindī's* description is very detailed, especially if compared to that in the *Ikhwān a-ṣ-Ṣafā'*.
3. The aesthetic formulations regarding the 'harmonious' proportions of the *Ikhwān a-ṣ-Ṣafā'* 'ūd are decidedly relative.

It is now possible to note that the 'ūd in the *Kanz a-t-Tuḥaf* (Fig. 4 and Fig. 5) is quite similar to *Kindī's* 'ūd⁴⁸, apart from the neck which is slightly smaller (9 fingers instead of 10). However this could be the consequence of the lack of precision in the bridge position (*musht*) and that its width is far too large and deported towards the nut with regard the version in figure 5⁴⁹. The ratios of the soundbox (depth/width = 1/2) show that the principle described by *Kindī*, about a hemisphere inscribed in the box is equally possible with this instrument.

Discussion

In his article on 'ūd-making, Neubauer proposes a synthesis⁵⁰ of the proportions given by various Arabian authors of the past. The following section will be based on his findings.

Neubauer's understanding on *Kindī's* 'ūd proportions

Neubauer starts⁵¹ from his observations on the proportions of the 'ūd from early descriptions, and particularly with those given by the *Ikhwān a-ṣ-Ṣafā'*. These are based on proportions of '1:2:3' between the depth, the width and the length as defined in the documents investigated⁵². Neubauer notes that the proportions given in the *Kanz a-t-Tuḥaf* manuscript are similar⁵³, since the *Ikhwān* write that 'the neck (Hals) of the 'ūd [equates] to a quarter of its length⁵⁴.' Neubauer interprets these indications differently from the method that we have chosen in the aforementioned section dedicated to *Kindī's* hemispherical soundbox 'ūd, where it is clearly said that the neck of the 'ūd, as we

agree, must be equal to a quarter of the total length of the instrument (soundbox and neck included from the lower part of the box to the nut⁵⁵); the first of the Arabic editions (*Bustānī*) from the *Ikhwān a-ṣ-Ṣafā'* writes that:

'The specialists of this art have said: for the instrument called 'ūd, take some wood the length, width and thickness of which must be in the noble proportions [*sharifa*] and which is that its length is as its width and as its half, and its depth [is] as half of its width, and the neck of the 'ūd is [equal to] a quarter of the length [...]'⁵⁶.

However, this citation does not mention that 'the (first) length of the 'ūd' is in fact the length of the (sound)box, while it is the total length of the instrument that is meant at the end of the citation (which is mentioned by many scholars). Therefore the width *l* of the 'ūd would be equivalent to two thirds of the total length *L* (since the length is 'as the width and as its half' - $l = 2L/3$), and the depth *P* would be a third of the total length ('its depth [is] as half of its width' - $P = L/3$); The length of the neck *M*, which should be included in the total length, would be equal to its fourth ($L/4$). Should we consider the depth *P* as the unit of measure of these proportions (instead of the total length *L* that we had chosen for unit in our revision), the other dimensions would be expressed by $L = 3P$, $l = 2P$ and the length of the neck $M = 3P/4$ (three quarters of the depth) - these proportions are those given in figure 7, and give proportions of 1:2:3 for the relation between $P/l/L$, since the total depth of the 'ūd (which is equal to the depth of the box) is half the total width of the 'ūd (which is also the width of the box) and the third of its total length (which is not the length of the box as in the extract above). The length of the neck would be in a relation of 3/4 to the depth (as indicated above), and 1/4 of the total length of the instrument, which would satisfactorily complement the *tetraktys*.

However, Neubauer has chosen, in the article in question⁵⁷, another interpretation which refers to *Kindī's* description (given above in the section about him), in 'muscular' fingers to give the soundbox of the 'ūd of the Brethren of Purity (or *Ikhwān a-ṣ-Ṣafā'*) the ratios of 1/2/3, with $P = 1(P)$, $l = 2(P)$ and $L(\text{box}) = 3(P)$ and the length of the neck always equals to a quarter of the total length of the instrument (Fig. 8).

Therefore the total length of the instrument would become:

$$L = L_{(\text{box})} + M_{(\text{neck})} = L_{(\text{box})} + L_{(\text{total})}/4, \text{ hence } L = 4L_{(\text{box})}/3 \text{ and } M = P.$$

This interpretation has completely changed the previous figures and would imply modifications in our deductions which would lead to the following corrections:

1. Total length = $L = 4L_{(\text{box})}/3 = 4P$
2. Total width (same as that of the box) = $L/2 = 2P$
3. Total depth (same as that of the box) = $L/4 = P$
4. Neck = $L/4 = P$
5. Length of the soundbox = $3L/4 = 3P$
6. Position of the bridge: unknown
7. Total speaking length, speaking length above soundboard, etc.: unknown.
8. Soundbox: width/length = $2/3$; depth/width = $1/2$

It would seem obvious that the general shape of the 'ūd seems closer to contemporary instruments and especially to *Kindī's* as corrected above, but raises an organologic problem with the size of the neck and with the speaking length of the string. We have noted that the *Ikhwān a-ṣ-Ṣafā'* did not give indications about the positioning of the bridge or for the speaking length of the string, hence our hesitation in figures 7 and 8. Estimating that the speaking length on the neck must be between the fourth (minimum) and the fifth, (maximum, as generally observed), we can attempt at determining, at least the position of the bridge. Should the neck of the 'ūd of the *Ikhwān a-ṣ-Ṣafā'* in Neubauer's interpretation correspond exactly to the fourth, which equates to a quarter of the speaking length, the bridge should be (attached) at the base of the box (left on figure 9) and the total speaking length should be equal to the total length of the 'ūd.

Should the length of the neck be such that the speaking part of the string, from the nut to its position on the soundbody corresponds to the fifth (as with most contemporary instruments), the bridge should be placed very high on the soundboard (right of the drawing) with the consequence that the playing of the instrument would be very difficult (physically) because of the playing position repositioned towards the top of the instrument (towards the right in figure 10).

In the literal interpretation that we have proposed, the configuration where the speaking length above the neck equates to the location of the fourth and gives a similar design (Fig. 11) to Neubauer's (compare with figure 9). However, the positioning of the bridge on the soundboard in case it should equate a fifth (figure 12 to compare with figure 10) is more in keeping with conventional 'ūd organology.

Figures 13 and 14 show two extreme positions of the bridge in Neubauer's interpretation (Fig. 13) and with ours (Fig. 14). Both interpretations remain acceptable.

Another Arabic version in our possession is Dieterici's⁵⁸:

'and the best of instruments [they made] was the 'ūd which had length, width and depth in the best proportions which is half the length is as its width and its half, and its depth [be] as the half of its width, and then its depth will be a quarter of its length [...]'⁵⁹.

This version is disconcerting as it makes no mention of the neck of the 'ūd, but it must be inferred here that the 'second' depth in the cited text (in italics) is in fact the neck of the 'ūd. Neubauer's interpretation would be more logical which says that the second 'length' is that of the total, (length of the instrument while the first 'length' was that of the sound-box, which we have translated as 'body').

The same applies to Shiloah's interpretation which appears to agree with Neubauer's:

'We say that the people of this art maintained that the instrument called 'ūd should be made of wood, and that its length, breadth and depth should stand in a noble relation to each other, that is to say, that its length should be in the proportion of 3:2 with its breadth; its depth should be equivalent to half its breadth and its neck should equal one quarter of the total length of the instrument'⁶⁰.

It would appear that the interpretations of these two authors oppose our interpretation of the text. However, this does not explain the shifted positioning of the bridge should the length of the neck equate to the fifth. Nevertheless, should the first interpretation (Neubauer's and Shiloah's) be retained, the proportions between P (depth of the soundbox), I (width of the soundbox), $L_{(\text{soundbox})}$ (length of the soundbox) and L (total length of the instrument), would equate to the (remarkable) series of 1:2:3:4. Neubauer has noted these proportions (at least for the first three

terms of the relation of 1:2:3) and compared them⁶¹ to the *Kanz a-t-Tuḥaf* 'ūd for which we have produced two hypotheses for the placement of the bridge (Figs. 4 and 5⁶²). Reconsidering the depth of the soundbox, as given by the authors (which as in *Kindī* is equal to 7.5 'fingers') he assumes that this soundbox should have had a width equating to twice the depth (or $2P = 2 \times 7.5$ 'thick, muscular fingers'), which is correct, and a soundbox length of three times this value (= 22.5 fingers). This would disagree with the indications of the manuscript which says that it should be 27 fingers⁶³; should the total length given be 36 fingers, the hypothesis of a soundbox with a length of 22.5 fingers would imply a neck 13.5 fingers long (or 36 fingers of total length minus 22.5 fingers for the soundbox). The author notes this discrepancy between 'theoretical' values and values given, in writing, in the manuscript. Since we have not had access to Farsi and Turkish versions⁶⁴, we were not able to check if the theoretical proportion was mentioned in the text. The opposition between theory and 'practice', (measurements of the different parts, written down) is explained by Neubauer from his interpretation of *Kindī*, and yields measurements similar: depth of 7.5 fingers, width of 15 fingers, still in a 1:2⁶⁵ relationship, with a soundbox of 26 fingers while, 'ideally', it should have been 22.5 fingers. This soundbox length is between three and four times its depth (between 22.5 and 30 fingers), and Neubauer assumes [*idem*, p. 295] that *Kindī* would have tried to describe two 'ūds in one: the Persian and the mace-shaped one⁶⁶, hence the compromise between the ratios of 1:2:3 and 1:2:4 (the third figure being the speaking length)⁶⁷, with proportions of 1:2:3,47. The author adds to his argumentation that the last ligature mentioned by *Kindī* ends at a quarter of the speaking length ('Mensur' in the text), and that the neck ends at a third of this length and that the width of the soundbox equates to half of its length (of the whole speaking length)⁶⁸. On top of it all, Neubauer postulates, quoting *Kindī*, that we give below in its translation from the German:

'Half of the speaking length equates to the width of the [sound]box of the lute, and "this is the widest part of it [the instrument]. The location of the [greatest width⁶⁹] of the lute must be placed at three finger's width from the end of the bridge towards the strings⁷⁰.

The reason is that it is facing [gegenüber]⁷¹ the place where the strings are plucked for the reason that this part [of the lute] is [that where the width is] the widest and therefore the most resounding [in our interpretation 'the most perfectly sounding']. The plucking point of the strings⁷² is therefore placed at three widths of fingers above the bridge⁷³, because it is at this emplacement that there is a [point of] division of the string, a tenth"⁷⁴. If we add three widths of fingers to the six fingers which separate the bridge from the lower part of the [sound]box, [and] we have a distance of nine fingers between the lower part of the box and its largest part, which is also the plucking point of the strings. If the lower part of the box is perfectly round [or rounded] in its bottom part, this should correspond to its radius. However, according to other indications given by *Kindī* the ['measure', or the 'length' of] the radius (and the depth) amount(s) to only 7.5 widths of fingers. Its 'largest width' here described is obviously given in reference to what he calls the total length of 36 fingers for an instrument of 9 fingers in depth, and of 18 fingers of width for an average bellied 'ūd. This supports the hypothesis [the 'supposition' that in his measurements [*Kindī's*], different types of lutes would have been mixed-up, hence the confusion'⁷⁵.

Neubauer's two key-point argumentation are:

1. The emplacement and width of the bridge
2. The plucking point of the strings

These points will now be investigated.

A new argumentation about the shape and the proportions of the 'ūd as described by *Kindī*.

Kindī's text is clear about his emplacement of the bridge, notwithstanding Neubauer's interpretation. Undoubtedly *Kindī* says⁷⁶ that: 1. The *front side of string attachment*⁷⁷ (towards the top of the instrument when held upright) of the bridge is placed at 6 fingers from the lower end of the box (statement - 'the measurement of the width of the *musht* [bridge] and the remainder behind it: 6 fingers' - 'behind it' meaning towards the lower end of the box; since the total length of the strings is 30 fingers and the total length of the 'ūd is 36 (see figure 15). 2. 'The neck measures a third of the length' of the vibrating strings (neck 'to the fifth'), that is 10 fingers (written). 3. The position of the widest part of the box (and of the 'ūd) is located at 7.5 fingers from the lower end of the box since it is clearly indicated that the box circumscribes an hemisphere (written). 4. The ideal

plucking point is at one tenth of the speaking length from the bridge, thus at 3 fingers (written).

It will be necessary to add, obviously, to the distance of 6 fingers from the tying point of the strings to the lower end of the box, 3 fingers of the distance between the bridge and the optimal plucking point ('and with regard the striking of the strings, it is situated at 3 fingers away from the *mushṭ* [6 + 3 = 9 fingers from the bottom] because it is the position of one part of the string and it is its tenth') to measure a distance of 9 fingers between the plucking point and the lower end of the box, with which we agree.

Notably, Neubauer based his figures on the translation of '*muḥādhāt*' (which we interpret as 'along', 'in the proximity of') with 'opposite' or 'facing' (which is another meaning for '*muḥādhāt*') and locates the plucking point of the strings on the line of greatest width, since 'this emplacement [of the lute] is [that where the width is] the greatest and the most resounding'; however, neither this is the only linguistic interpretation (see note 42 and figure 15) nor an organological rule as there are more considerations with regard the emplacement of the plucking point, such as intensity and timbre but also and principally, human morphology and the handling of the *ūd* while played⁷⁸.

As we have already explained, *Kindī* says that the optimal plucking position of the strings is *close* to the widest part of the box, but further in the direction of the neck: this concurs with our present knowledge of the *ūd* and its organology, and practice. Additionally, the *ūd* can also be played with the musician standing. This changes the plucking point towards the bottom of the instrument as the musician is obliged to hold or cradle it with his forearm⁷⁹, but the plucking points can also vary with other positions⁸⁰; while sitting, the forearm is more relaxed as the wrist is positioned further towards the strings^{81/82}; and of course a choice of particular timbre can also influence the plucking points.

Figure 17 has a stylised representation (seen from the top) of the forearm of an 'average-sized' musician (let us say about 1.68 metres tall) with his hand (bent), about 36 cm (or 18 '*Kindī*' fingers), between the hollow of the elbow and the tip of the middle finger, in plucking position. The distance between the resting point of the forearm (usually by its hollow) and the plucking point with a plectrum, varies (measurements are always approximate in these positions) between 20 to 28 cm, depending on the plucking angle and on the morphology of the performer, about 10 to 14 fingers according to

Kindī, or slightly less with a finger width of 2.2 cm, (for example, or of a smaller morphology of the standard ancient Arabian type - which is probable), thus (about) 9 and 13 fingers. This would locate it between *Kindī*'s position (obtained by deduction - 9 fingers) and half of the length of the box length (13 fingers).

This constitutes the optimal (and not the ideal) plucking point preferred by generations of lutanists. It is possible for the player to lower slightly the elbow towards the base of the box (or to bend the wrist a bit more) and play closer to the bridge⁸⁴, or, inversely, by extending the arm on the soundboard, play closer to the neck. However, these positions correspond to specific types of playing, the first, closer to percussion and the second with more rounded sounds (with few high harmonic intensity and a generally more relaxed plucking of the strings and resulting sounds).

There is no imperative reason, either linguistic, organological, or morphological, therefore to impose forcibly the position of the largest width of the box to correspond to the optimal plucking point of the strings of *Kindī*'s *ūd*.

As for the position of the 'widest part' of *Kindī*'s *ūd*, it suffices to read thoroughly *Kindī*'s text (note 42) to understand that it can only be at a distance of 7.5 fingers from the bottom of the instrument, and can not be, as Neubauer writes, at nine fingers from the bottom (*i.e.* at the optimal position of the plucking of the strings, the two positions being different).

Conclusions

The two main examples given in this article are only two among dozens of errors about the *ūd* in the specialised material⁸⁵. These errors are the consequence, as we have mentioned it in the introduction, of negligence and of poor methodology. Certain interpretations, especially related to the 'harmonious' proportions are typical of 'Pythagorean conspiracy'⁸⁶, established from at least the 19th century, and which attempted at re-writing the history of music with Occidental principles gathered through theories and history of Ancient Greek music, force-feeding Oriental music in a reductive carceral mould. It suffices to read theoretical speculations of the *Ikhwān a-ṣ-Ṣafā'* and compare them with other precise descriptions of the same period (Figures 1, 6 or 15), or with modern or contemporary *ūds* (Figures 2, 3 and 18) to understand that the proportions of this instrument depend on each luthier, on traditions and local preferences.

The insistence of force-fitting these proportions in the Pythagorean carceral mould is all but denial of musical praxis⁸⁷.

This is particularly obvious with regard the description of the 'fretting' of the 'ūd⁸⁸ with which we are confronted on a daily basis in our researches on Arabian music. In order to rid ourselves from the consequences of schemes arising from these ludicrous errors, researches and publication of articles are no longer sufficient. It is imperative that these errors are eliminated as their publication with leading publishing houses will with time hide the truth forever⁸⁹.

Notes

1. This article draws from the author's book *Théories de l'échelle et pratiques mélodiques chez les Arabes – Volume 1 : L'échelle générale et les genres – Tome 1 : Théories gréco-arabes de Kindī (IX^e siècle) à Ṭūsī (XIII^e siècle) 1/4 (vol.)*, Librairie orientaliste Paul Geuthner, (Paris, 2010-11).

2. It would not be appropriate to explain, in the present article, the differences between a long-necked lute (*ṭunbūr*) and the short-necked instrument the technique of which, the structure and the art of its playing being considerably different for each of these instruments. For further explanations, see Appendix A in [Beyhom, 2010].

3. Most of these are about the assumption of the 'fretting' of the instrument, a myth which has been established and propagated by two Western authors cited in this article, respectively Farmer and Neubauer. See the sections about the 'fretting' of the 'ūd in [Beyhom, 2010, Appendix A].

4. For example: the second cited article is printed in the New Grove, its contents are considered as truthful beyond reasonable doubt, and the mistakes it holds are widely broadcast. For instance a 2013 Google search for the following text: 'A spherical shape may even have been envisaged', linked to other sites: <http://www.scribd.com/doc/64211493/The-Oud-The-King-of-Arabic-Instruments> and <http://www.oud.eclipse.co.uk/history.html>, etc.



5. *Abū-l-Ḥasan Muḥammad ibn al-Ḥasan ibn a-ṭ-Ṭaḥḥān* was a musician of high repute during the Egyptian Fatimid Period who died sometime after 1057. He was mainly an instrumentalist and is with *Kindī* one of the very few having described the 'ūd and its facture. His work entitled *Hāwī al-Funūn wa Salwat al-Maḥzūn* is in two parts the second of which being about praxis.



6. Farmer, Henry George: 'The Structure of the Arabian and Persian Lute in the Middle Ages', *Journal of the Royal Asiatic Society of Great Britain and Ireland* (1939), pp. 41-51.



7. Bouterse, Curtis: 'Reconstructing the Medieval Arabic Lute: A Reconsideration of Farmer's "Structure of the Arabic and Persian Lute"', *The Galpin Society Journal* (1979) [doi:10.2307/841532], pp. 2-9.

8. [Farmer, 1939, *op. cit.*, p. 47]: we find the description of these measure units ('*aqd* excepted) in a footnote of the same article (Farmer, 1939, *op. cit.*, p. 43, note n°4): 'Scale of measurements: *isba'* (Arab.), *angusht* (Pers.) = 2.25 cm. *isba'* *maḍmūm* (Arab.), *angusht mundaḥ* (Pers.) = 4.5 cm. *shibr*

(Arab.) = 27 cm.'; the error consisted, as shown in this article, in one word: *maḍmūma*, as an adjective for *aṣābi'* (fingers). Farmer thought that *maḍmūma* meant 'joined', which is correct, but ignoring the subtleties of the language (or being too hasty in his lexicology) considered that one *isba'* *maḍmūm* was equivalent to the double thickness of a finger, which roughly doubled all of *a-ṭ-Ṭaḥḥān's* measurements.

9. There is a transcription by *Zakariyyā Yūsuf of Ṭaḥḥān (al-Mūsīqā)*, *Abū-l-Ḥusayn Muḥammad ibn al-Ḥasan al-Ḥusaynī, Hāwī al-Funūn wa-Salwat al-Maḥzūn, Al-Majma' al-'Arabiyy li-l-Mūsīqā*, (Baghdad, 1976). In this transcription, p. 99, Yūsuf uses  instead of . Please note that extracts of the manuscript that we produce here are lifted from the pages of *A compendium of a Fatimid court musician - Hāwī al-Funūn wa-Salwat al-Maḥzūn* [Reproduction of the manuscript *Funūn Jamīla* 539 of the *Dār al-Kutub* National Library of Cairo], edited by Eckhard Neubauer, Facsimile Editions 52, Institut für Geschichte der Arabisch-Islamischen Wissenschaften, (Frankfurt am Main, 1990, 87rev.).

10. In Yūsuf (1976, p. 99)  is missing ().

11. According to Yūsuf (1976, p. 99)  for .

12. In Neubauer, 'Der Bau der Laute und ihre Besaitung nach arabischen, persischen und türkischen Quellen des 9. bis 15. Jahrhunderts', *Zeitschrift für Geschichte der Arabisch-Islamischen Wissenschaften*, Institut für Geschichte der Arabisch-Islamischen Wissenschaften an der Johann Wolfgang Goethe-Universität (Frankfurt am Main, 1993) pp. 279-378 [here p. 358], the term is transcribed as '*unuq*' which is one of two possibilities found with '*ūnq*' masculine or feminine), in the *Lisān al-'Arab [Ibn Mandhūr*, p. 3133].

13. As, for instance, in karate. In this case, the 'measure' can only be done at the level of the third phalanges (including the phalange on the tip of the finger as first one) of the 'tight' fist, with a finger width slightly larger to the width of a stretched finger (still measured from the third phalange), but the difference is minimal (about a millimeter per finger) and far away from Farmer's distinction who simply doubles the figure.

14. That the fingers be 'tightened' or 'joined'.

15. Farmer, 1939, *op. cit.* p. 43-4.

16. Which figures in the missing folios of the manuscript that Farmer had read. The whole of *Kindī's* epistle is given in the Annexes of (Beyhom, 2010).

17. *Kindī (al-)*, *Ya'qūb ibn Ishāq, Risāla fi-l-Luḥūn wa-n-Naghām (Mukhtaṣar al-Mūsīqā fi Ta'līf a-n-Naghām wa Ṣin'at al-ūd)*, edited by *Zakariyyā Yūsuf, Maṭba'at Shafīq (Baghdād*, 1965), p. 11:

فأول ذلك أن يكون طوله: ستاً وثلاثين اصبعاً منضمة
بالأصابع الممتلئة الحسنة اللحم ويكون جملة ذلك ثلاثة أشبار

18. The measure made between the thumb and the end of the auricular of the hand well stretched (the old 'span' or the 'espan').

19. *Ma'lūf, Luwīs (Louis Maalouf), Al-Munjid fi-l-Lughā wa-l-A'lām*, 36th edition, *Dār al-Mashriq* (Beyrouth, 1997), p. 519.

20. The peg-box of the 'ūd is at a varying angle with the neck, seen from the side. The total length of the 'ūd cannot therefore take the pegbox in consideration. The total length of the instrument will therefore include only the neck and the soundbox.

21. The tenth edition of Merriam Webster's Collegiate Dictionary (Merriam-Webster, 1997, p. 805) writes that '*odd*, means: b (1) left over after others are paired or grouped (2): separated from a set or series 2 a: somewhat more than the indicated approximate quantity, extent, or degree ...'. In *Ṣubḥī Anwar Rashid's* quotation of *Ṭaḥḥān*, in *Tārīkh al-ūd, Dār 'Alā'u-d-Dīn*, (Damascus - Syria, 1999), p. 53, the terms used to describe the distance to the bridge (*mushṭ*) are *isba'ayn wa kisr* (as it is mentioned by *Ṭaḥḥān's* above), this word describes a fraction. The English term *odd* correctly used by Farmer to

equate Arabic *كمر* corresponds therefore to the remainder of a group of elements (see explanations below). However, the measure Farmer gave (4.5 cm) could be slightly increased (to 5 cm for example), as this would bring back the position of the bridge (*musht*) to the position on contemporary 'ūd. It now remains to find out the distance between this base and the line of string attachment on the *musht*, about which *Ṭaḥḥān* gives no indication. If this distance is almost equal to the distance between the base of the bridge and the lower part of the instrument, this would coincide with *Khulaṭ*'s proportions of the 'ūd given below.

22. See examples given at the end of the article.

23. These various hypotheses are re-visited in the section about *Kindī*'s 'ūd below.

24. *Khulaṭ*, *idem*, p. 53, figures 2 and 3. The proportions of this instrument are succinctly described in *Khulaṭ* (*al-*), *Muḥammad Kāmil*, *Kitāb al-Mūsīqī a-sh-Sharqiyy* [The book of oriental music / Le livre de la musique orientale] (1904), pp.49-53. The only literal indications about exact measurements being the length of the neck (19.5 cm and), the width of both its sides (4.5 cm by the nut and 5.5 cm at its junction with the soundbox), and the total speaking length (64 cm). These indications do not agree with measures taken directly from the diagram provided by the author, hence added corrections (to 5 mm) in the proportions below, since the measures were taken from a speaking length (on the author's diagram) equal to 64 cm.

The measures taken directly from the diagram are given in bold figures:

1. Total measured length = **71.5** cm = *L*
2. Total measured width = **35** cm
3. Total depth: unknown
4. Neck: written → 19.5 cm (x 4.5 at the nut and 5.5 cm at the junction with the soundbox). Measured → **19.5** (x **4.5** cm at the nut and **7** cm at the junction with the soundbox).
5. Length of the soundbox (measured) = **52** cm
6. Emplacement of the bridge (measured) = **7.5** cm
7. Total speaking length (written and taken as measurement unit) = 64 cm
8. Speaking length of the string above the soundboard (calculated) = 64 cm - 19.5 = 44.5. The measured length is **44.5** cm
9. Optimal plucking point (calculated from the bottom, to the centre of the protection plaque) = **15** cm
10. Soundbox: width/length = 15/26 = more or less 5/9; Depth/width unknown.

25. British Museum copy from Or. 2361, folio 261, obv. in Farmer, *op. cit.* p. 49.

26. *Ankasht dast* in Farsi, which would seem to equate to a 'finger', according to the *Anṭūn Ilyās*, *Farahnak Nwīn* ('Arabī-Fārisiyy'), translated by *Muṣṭafā Ṭābātābānī*, Tehran, p. 364

27. Farmer, 1939, *op. cit.*, p. 48.

28. Several interpretations can bring up changes in the proportions of the instrument. We are currently working on a forthcoming book devoted to the 'ūd and its history as well as its making, its tunings and so forth. We shall note here as we shall see later that the 'ūd in *Kanz a-t-Tuḥaf* is very close to *Kindī*'s (9th century, nicknamed 'the philosopher of the Arabs'). Excluding the neck which is shorter (9 instead of 10 fingers, see figure 3), but this discrepancy could come from an imprecise definition of the distance to the bridge (*musht*). The proportions of the soundbox (depth/width = 1/2) show that *Kindī*'s description of the principle that we reproduce in the second part of this paper about the hemisphere being inscribed in the soundbox, is possible for this instrument.

29. Let us note here that Farmer quotes an alternative formulation, from *Kanz a-t-Tuḥaf*, for certain proportions of this 'ūd (or for another). To be more precise: *Another authority says that the length of the lute should be one and a half times as much as its width, and the depth should be one half of its width* (See Farmer, 1939, *op. cit.*, p. 48). This formulation not being supported by any precision, we could not

have included it in our article.

30. Farmer died in 1965 (see Wikipedia contributions, 'Henry George Farmer' Wikipedia, the free encyclopaedia (2013-1-4) http://en.wikipedia.org/w/index.php?title=Henry_George_Farmer&oldid=531344193], or Cowl, Carl et Sheila M Craik, Henry George Farmer: a bibliography, Glasgow University Library Studies, GLUS, Scotland, 1999), He would have had plenty of time to make emendations between 1939 when he wrote his article on the 'ūd and his death. We had to rely on Bouterse's article, ten or so years after to address the matter.

31. Poché, Christian, 'Ūd, Grove Music Online, (2001-2014), p. 25-31 in Volume 26 of the printed edition of 2001.

32. Poché, *idem*, p. 26: '[A] spherical shape may even have been envisaged: *al-Kindī* (9th century) described the body of the lute as a ball divided in two.' The author, does not give any bibliographic reference for *Kindī*, and even does not mention any scholar from whom he would have lifted the descriptions.

33. *Idem*

34. *Idem*, p. 30

35. *Idem*: '*al-Kindī* (9th century) described the body of the lute as a ball divided in two, but a century later the *Ikhwān al-Ṣafā*' Encyclopaedia (Shiloah, 1978) suggested "harmonious proportions". The work cited is from Amnon Shiloah: 'The epistle of music of the *Ikhwān al-Ṣafā*': (Bagdad, 10th century), *Ti'ud ve-ḥayun*, 3 (1978), Jerusalem'.

36. *Kindī* (*al-*), *Yā'qūb ibn Ishāq*, *Mu'allafāt al-Kindī al-Mūsīqiyya* [Works of *Kindī* on music], editor *Zakariyyā Yūsuf*, *Maṭba'at Shafīq* (Baghdād, 1962).

37. (*Yā'qūb ibn Ishāq Abū Yūsuf - 0801?-0867? al-Kindī*) : *[The epistle of al-Kindī on melodies and notes]*, manuscript edited by *Zakariyyā Yūsuf* in 1965.

38. Shawki, Dr. Youssef, *al-Kindī's essay on composition*, National Library Press, Cairo, Egypt, 1996.

39. The *shibr* (singular of *ashbār*), and the old 'espan' as aforementioned is a measurement unit which equals roughly to 18-24 cm, depending on the hand. It equates to the measured length between the tip of the thumb and the tip of the auricular finger when stretched flat and in opposite directions. If the *shibr* measures 12 fingers (36:3), a 'full' finger should be about 2 cm in width.

40. Arabic *kh[ar]f[a]t[a]* means to 'adjust', to 'shape' something, or to 'refine' or in another interpretation, to 'pick the leaves of' (a tree or a branch) (see [Munjid, *op. cit.*, p.174] and [Abdelnour, (Dr.) *Jabbour, Abdelnour*, Dictionnaire Moderne Arabe-Français, 17th edition, *Dār al-ilm lil-malayin* (Dār al-ʿIlm li-l-Malayin), Beyrouth, Lebanon, 2008, p. 445]). The '*khari*' of the 'ūd (could be a stick of wood), is mentioned by the *Lisān al-ʿArab* of (ibn) *Manzūr* (1232-1311), *Jamāl al-d-Dīn Abū al-Faḍl Muḥammad Ibn Mukarram ibn ʿAlī ibn Muḥammad ibn abī al-Qāsim ibn Habaqa[t]*, *Lisān al-ʿArab*, editors 'Abd-al-Lāh 'Alī Kabīr (*al-*), Muḥammad Aḥmad Ḥasab-al-Lāh, and Ḥāshim Muḥammad Shādhilī (*al-*), *Dār al-Maʿārif*, Cairo 1981, p. 1134: '*wa kharaṭtu al-ʿūd(a) akhruṭuhu*'.

41. *Kindī*, 1965, p. 11:

طوله: ستا وثلاثين اصبعاً منضمة - بالأصابع الممتلئة الحسنة اللحم - ويكون جملة ذلك ثلاثة أشبار. وعرضه: خمس عشرة اصبعاً. وعمقه: سبع أصابع [112و] ونصفا. وتكون مسافة عرض المشط مع الفضلة التي تبتى وراءه: ست أصابع. وتبقى مسافة الاوتار: ثلاثون اصبعاً. وعلى هذه الثلاثين الاصبع تنوع القسمة والتجزئة. لانها المسافة المصوتة. فلذلك ينبغي أن يكون العرض: خمس عشرة اصبعاً وهي نصف هذا الطول. وكذلك العمق: سبع أصابع ونصفا وهي نصف العرض وربع الطول. ويجب أن يكون العنق ثلث الطول وهو: عشر أصابع. ويبقى الجسم المصوت عشرون اصبعاً. ولكن ظهره على حقيقة الاستدارة، والمحرط إلى حمة العنق، كأنه كان جسماً مستديراً خطاً على بركال ثم قسم بنصفين لخرج منه عودان.

42. *Kindī*, 1965, p. 14:

« [...] ثم صيروا الجزء الذي بعد الثالث - وهو النصف - للعرض وهو أعرض موضع يجب أن يكون فيه، ويجب أن يكون موقعه من العود على ثلاثة أصابع من نهاية المشط إلى ما يلي الأوتار، والعلة في ذلك، محاذاته لمضرب الأوتار، وذلك أن هذا الموضع من العود أكثره سعة وأكمله دوبا، وإنما صار مضرب الأوتار على ثلاث أصابع من المشط لأنه موضع جزء من أجزاء الوتر وهو العشر.

In order to understand correctly this excerpt, one must be aware of four important facts in *Kindī's* reasoning. Firstly that this complementary description is part of an exercise in giving the proportions of the 'ūd in simple ratios from 1/2 to 1/10. Secondly that *Kindī* uses it in order to give, elegantly, a detailed description of the positioning of the bridge and its width (details he would not give in the first description for the overall proportions of the instrument). Thirdly that in this second description *Kindī* differentiates the front from the back part of the bridge, fourthly he gives his explanations in a certain order, and with clear propositions of causality or exclusion that allow a complete understanding of his discourse. The strings on *Kindī's* 'ūd must be, for clear organologic reasons (the shear pressure on the front side of the bridge should the strings be tied on the back side) tied on the front part of the bridge (the side in the direction of the strings, i.e. in the direction of the neck - (see figure 15) the only purpose of which is devoted to explaining this particular point). The position of the 'widest part' of the belly, which is the diameter of the inscribed hemisphere (the 'ball divided in two'), is 'three fingers away from the end of the bridge in the direction of the strings' (our italics), i.e., *three fingers including the width of the bridge itself*. Knowing that the position of the widest part ('largest width') of the belly is already given as 7.5 fingers from the bottom (in the preceding excerpt), and knowing that the (front part - where, obviously, the strings are tied, as it is the overall proportions that are given in the first excerpt) of the bridge be placed at six fingers from the bottom, this indication gives us in fact not the position of the widest part of the belly (already given in the first excerpt), but the width of the bridge. The latter is deduced as the difference between the distance from the back of the bridge to the widest part (3 fingers - written data) minus the space between the widest part of the belly and the front of the bridge i.e. the difference between the position of the widest part of the belly (7.5 fingers - written data) and the position of the front of the bridge (5 fingers - written data), which gives $3 - (7.5 - 6) = 1.5$ fingers. In what concerns the position of the 'optimal striking point on the strings', the order of succession of the descriptions, be it of the emplacement of the 'largest width' of the belly, or of the position for 'the plucking of the strings', excludes the second from the first because of the use of 'wa-innamā' [translated by 'and with regard', but also would be 'however'] which divides the two segments of the phrase, i.e. in separate formulations (the early Arabic writing did not use, or very rarely, punctuation, and prepositions were used to divide the text in coherent sections). This means that the position of the optimal striking point on the strings is given *independently* from the position of the widest part of the belly (although the two are related, the latter being 'in the proximity' - 'bi-muḥādhāt' - of the former, see our reasoning on this point lower in the text) as 3 fingers away from the front side of the bridge, as 'it is the position of one of the parts of the strings [and not of the soundbox or the complete length of the 'ūd] and it is its tenth'. The result as shown in figure 15 is consistent with *Kindī's* descriptions.

43. Which are Pythagorean and based on the following progression: '1 2 3 4' or of the *tetraktys* model.

44. Poché, 2001, *op. cit.*, quoting the *Ikhwān a-ṣ-Ṣafā'*, 1978, p. 33, translated by Shiloah says that 'its length should be in the proportion of 3:2 with its breadth; its depth should be equivalent to half its breadth and its neck should equal one quarter of the total length of the instrument.'

45. *Ikhwān a-ṣ-Ṣafā'*, *Rasā'il Ikhwān a-ṣ-Ṣafā'*, *Turāth al-'Arab* 1/4 (vol.), *Dār Bayrūt li-t-Ṭibā'a wa-n-Nashr*, Beirut, Lebanon, 1983, p. 203, in Arabic.

46. In terms of geometry, the curve of the box circumscribes the hemisphere.

47. See also figures 8 to 14 for alternative interpretations.

48. See figure 6. Please note that we use here the term *iṣba'* with all numerals that concern the length or width in fingers, even though classic Arabic language requires other rules of usage (i.e. '9 *iṣba'*' instead of '9 *aṣābi'*', or '2 *iṣba'*' instead of '*iṣba'ayn*'), for consistence in measurements (one name for each type of measurement).

49. We shall note here that Farmer quotes an alternative formulation in *Kanz a-t-Tuḥaf* for certain proportions of this 'ūd (or of another): 'Another authority says that the length of the lute should be one and a half times as much as its width, and the depth should be one half of its width.' (Farmer, 1939, *op. cit.*, p. 48): as written above, since this formulation did not include any other precision, we did not include it in our paper.

50. Neubauer, 1993, *op. cit.*

51. Neubauer, *idem*, p. 293

52. Reminder, see the sub-section in figure 7: 'the length must be one and a half time the width; the depth, half the width; the neck, one quarter of the length'.

53. *Idem*

54. *Idem*

55. *Idem*, p. 294

56. *Ikhwān a-ṣ-Ṣafā'*, 1983, p. 203:

ان أهل هذه الصناعة قالوا: ينبغي أن تتخذ الآلة التي تسمى العود خشباً طوله وعرضه وعمقه يكون على النسبة الشريفة، وهي أن طوله مثل عرضه ومثل نصفه، ويكون عمقه مثل نصف العرض، وعنق العود مثل ربع الطول

57. Neubauer, 1993, *loc. cit.*

58. This is also the version to which Neubauer refers: 1993, *op. cit.*, p. 290, note 34.

59. Dieterici, Fr, Die Abhandlungen der ichwan *Es-Safā'* in Auswahl Copie/, J.C. Hinrichs'sche Buchhandlung, 1886, p. 311:

وأحسن ما صنعوها الآلة المسماة العود فله جسم طوله وعرضه وعمقه على النسبة الفضل فهي أن يكون طوله مثل عرضه ومثل نصفه وعمقه مثل نصف العرض [عمقه] مثل ربع الطول

Here it must be added that the second 'عمقه' (its depth) has been replaced by 'عنقه' (neck), the first (repeated) term an error obviously, either from the copyist or of the edition.

60. *Ikhwān a-ṣ-Ṣafā'*, 1978, p. 32. Note that Shiloah's version is the only one giving a clear indication that the neck should be a quarter of the total length of the instrument.

61. *Idem*.

62. Note that the second hypothesis in figure 5 corresponds to a neck length equal to the fifth and that the position of the bridge is in the same proportion with the total length of the lutes in the *Ikhwān a-ṣ-Ṣafā'*, in Neubauer, figure 8.

63. The reader may come back to the sub-section about the 'ūd described in this manuscript, above.

64. And not conversant with either of these languages.

65. According to Neubauer [*Idem*].

66. Neubauer writes 'keulenförmig' or mace-shaped, or shaped like a leg of lamb, explaining in a footnote page 40 that the 'ūd' 'keulenförmig' has a width equal to a half of the speaking length (which he calls 'Mensur [von Steig bis Sattel]') - which is equal to 30 fingers (see figure 6) with *Kindī*, and that the 'rounded' 'ūd' ('gerundet') has a width equal to half of the

total length of the instrument (between nut and lower end of the soundbox).

67. 'Mensur' in his text - See note above.

68. See figure 6.

69. Placed in square brackets by Neubauer.

70. Our translation here is completely different from Neubauer's - See the part about *Kindī's 'ūd*.

71. Our translation of the Arabic *'muḥādhāt'* is 'alongside'.

72. In our translation, the sentence starts: 'with regard the plucking of the string, [it is placed...]' in [Abdelnour, 2008, p. 188], *'innamā'* means 'only, uniquely' hence the possible equivalence 'and certainly [...]' which would give for the beginning of the sentence: 'and certainly the plucking point of the string is placed ...'. Our friend Michel Gébara, professional translator and jurist informs us that *'innamā'* for him means 'however', which confirms the meaning of the concession.

73. '[At] three fingers from the bridge' in our translation.

74. Here ends Kindī's 'citation'.

75. Neubauer, *idem*, p. 295-6: 'Die Hälfte der Mensur entspricht der Breite des Korpus der Laute, und "das ist die breiteste Stelle, die an ihr sein darf. Der genaue Ort der [größten Breite] der laute muß drei Fingerbreiten vom Ende des Steges in Richtung der Saiten liegen. Der Grund dafür ist, daß er der Stelle gegenüberliegt, an der die Saiten angeschlagen werden, und dies, weil jene Stelle der Laute die weiteste und resonanzstärkste ist. Die Anschlagstelle [?] the graphics of the text change below] kam aber deswegen drei Fingerbreiten oberhalb des Steges zu liegen, weil sich dort ein Teil[punkt] der Teile der [klingenden] Saite befindet, nämlich der zehnte". Addieren wir die drei Fingerbreiten zu den 6 Fingern, die der Steg vom unteren Lautenrand entfernt steht, so erhalten wir eine Entfernung von 9 Fingerbreiten vom unteren Rand des Korpus für seine breiteste Stelle, die gleichzeitig der Anschlagstelle mit dem Plektrum entspricht. Da der Korpus in seinem unteren Teil kreisrund sein soll, müßte diese Strecke mit seinem Radius identisch sein. Nach al-Kindī's sonstigen Vorgaben beträgt der Radius (und die Tiefe) des Korpus aber nur 7,5 Fingerbreiten. Seine an dieser Stelle beschriebene "breiteste Stelle" bezieht sich offensichtlich, bei der von ihm genannten Gesamtlänge von 36 Fingerbreiten, auf ein Instrument mit 9 Fingern Tiefe und 18 Fingern Breite, das heist auf einen durchschnittlichen bauchigen 'ūd. Das verstärkt die Annahme, daß in seinen Größenangaben hier Werte unterschiedlicher Lautentypen ineinander geflossen sind, so daß sie ihrer Gesamtheit kein einheitliches Bild ergeben können'.

76. All of the following extracts have been referenced, unless otherwise specified.

77. On modern *'ūds*, the strings are attached as much as possible at the front of the bridge (if this is possible). The part which is glued at the back provides with a better strength against tearing-off under the tension of the strings. Should the strings be attached at the back, the front part would create a torsion line on the soundboard, making it more likely to be torn-off.

78. Marc Loopuyt (1989) explains efficiently in his article 'Mare Nostrum Comment nous tenir', La vocalité dans les pays d'Europe méridionale et dans le bassin méditerranéen: *Actes du colloque de La Napoule* (06), 2 et 3 mars 2000, éd par. L. Charles-Dominique et J. Cler, Éditions Modal (2002), the different positions which an *'ūd* player can take according to the type of playing, the habits, the tradition, the morphology, or social or economic needs.

79. Which generally modifies the timbre, making it richer in treble sounds: the reader can be given examples with Denny Walter, 'Music and Musicians in Islamic Art', *Asian Music* 17, 1 (1985), p. 37-68, here, p. 42 ('tenth-century ivory casket of al-Mughira, from Cordoba ; Paris, Louvre', and Denny, (1985), p. 49, 'Twelfth-century Fatimid ivory plaque[s] from Cairo depicting musicians [and dancers]; Florence, Museo Nazionale del Bargello' and also, the lute of Gandhāra line drawn by Marcel-Dubois that we include in figure 16; also 'l'ange musicien', end of the fourteenth century, 1390, detail

of a triptych (reliquary, in Farmer, Bachmann, Besseler and Schneider, *Musikgeschichte in Bildern: Islam*, [Band III: Musik des Mittelalters und der Renaissance/Lieferung 2], Veb Deutscher Verlag Fur Musik (Leipzig, 1966), p. 109), extract from a manuscript at the 'Monasterio de Pieda, Academia de la Historia, Madrid'. The pegbox is scarcely visible, the plectrum is similar to those used by modern lute players although held differently and the 'musician angel' is standing.

80. See the 'woman lutanist' on a shard of the tenth, eleventh centuries, Egypt, Museum of Islamic Arts, 5395/2. (Farmer, 1966, p. 49).

81. See 'The 'ūd player', silver coin of the tenth century, Baghdad. Staatliche Museen Berlin, Münzkabinett, n°212, (Farmer, 1966), p. 41.

82. See also the Byzantine ivory carving (9th - 10th centuries) part of four panels Hessisches Landesmuseum, Darmstadt No. Kg. SU. 215 <http://www.vanedwards.co.uk/history1.htm>.

83. In Marcel-Dubois, Claudie, 'Notes sur les instruments de musique figurés dans l'art plastique de l'Inde ancienne', *Revue des arts asiatiques* XI 1 (1937), pp. 6-49, pl. xiv-xv, ici p.41: 'C'est au Gandhāra que l'on voit pour la première fois un type de luth (Fig. I [notre figure]. Art gréco-bouddhique du Gandhāra. British Museum) qui se développera dans l'Inde jusqu'au VII^e siècle environ, puis passant par l'Afghanistan et l'Asie Centrale, deviendra le *pi-p'a* chinois et le *biwa* japonais actuels'.

84. As, for example, for the *Khula'i 'ūd* (Figure 2) where the protection plate is placed about 15 cm from the lower end of the box.

85. Some demonstrations have already been carried out in our Appendix A, Beyhom (2010), and others forthcoming in a specialised work in this field.

86. See Dumbrell, R., *The archaeomusicology of the Ancient Near East*, Trafford, Victoria 2005.

87. And an imposition of norms which could be applied but the practical value of which is not proven to this day.

88. See Appendix A in Beyhom (2010) and Beyhom, Makhlof, 'Fretage du 'ūd (luth arabe) dans la théorie musicale arabe et influence sur la pratique [The fretting of the 'ūd in Arabian music theory and its interaction with practice]', 5^{ème} Congrès de Musicologie Interdisciplinaire (CIM09), La musique et ses instruments, Fifth Conférence on Interdisciplinary Musicology | Paris, 2009-10-26 | [url: <http://cim09.lam.jussieu.fr/CIM09-en/Proceedings.html>, http://cim09.lam.jussieu.fr/CIM09-en/Proceedings_files/Beyhom-Makhlof.pdf].

89. As the philosopher al-Fārābī has written, (quoted in Beyhom, 2010, p. 210): 'We shall neither linger [in our work] in the exposition of scientific principles of numbers or of their corollaries. The reader in need of further information will find it in arithmetical treatises. Neither are we eager to establish a relationship between the moods of the sky, the character of the soul and the musical intervals. This would be acting in the same manner as those who cannot recognise the virtues of each science. Having inherited of a redundant and diffused philosophy, they confuse the essential attributes of things, with their accidental attributes. Some abbreviators have imitated them. But those who have understood the refined philosophy, who have understood correct distinctions, emended the errors that are the consequence of imitation and deleted the mistakes which hide the beauty of the ancient thought, those have met with a favourable welcome, as too many customs have been applauded wrongly, and too many compliments given without thought. We have attempted at progressing only in matters of which we are certain, without being bothered with calls of tradition. However, even with our greatest care and attention, it can be that certain mistakes have infiltrated our work. We hope that others will make appropriate emendations what is in excess or fill lacunae. We call for God's help, we beg for his mercifulness so that he allows us to conduct our task to its best.'

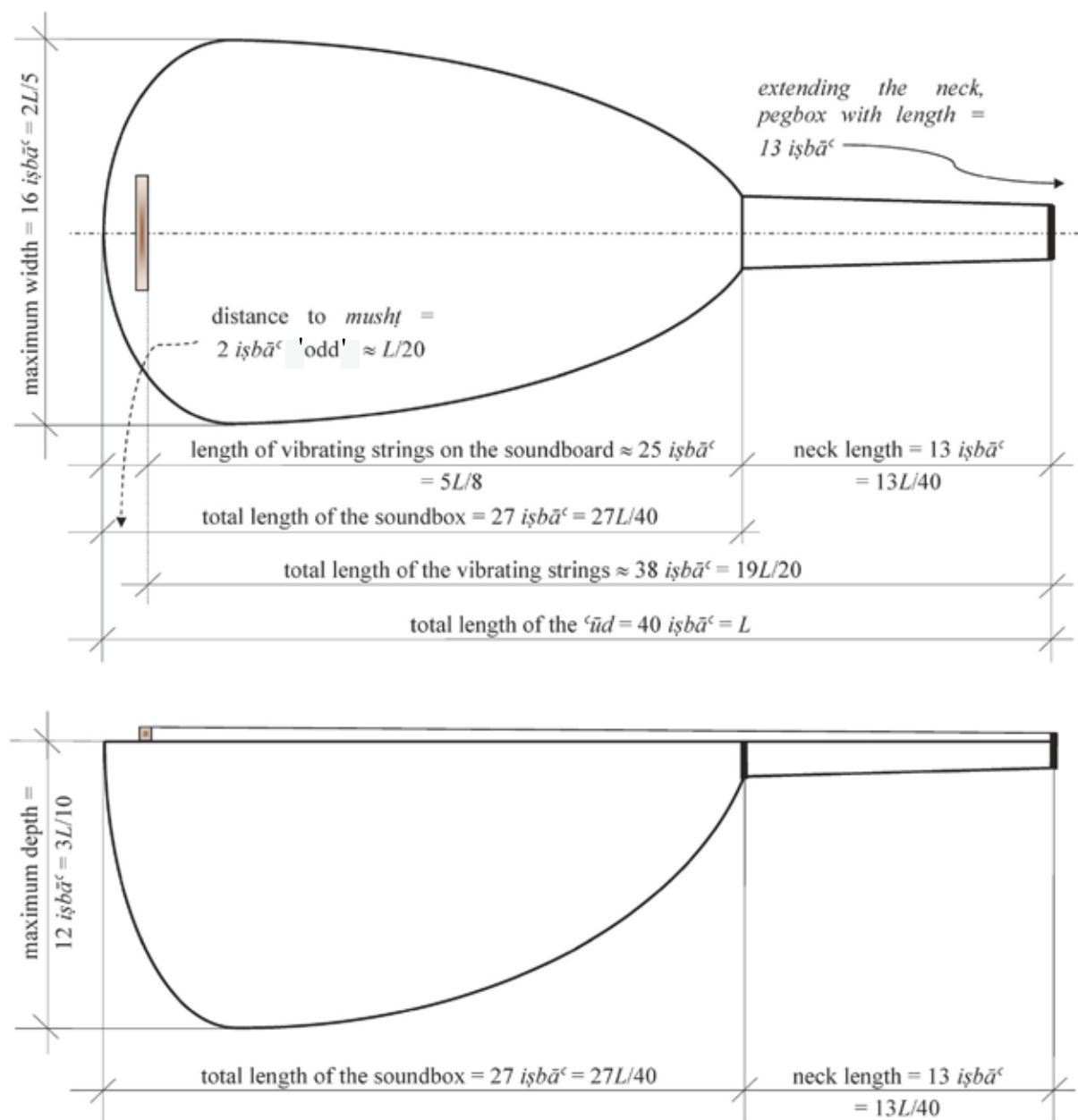


Fig. 1. Drawing of Tahhan's 'ūd, 11th century.

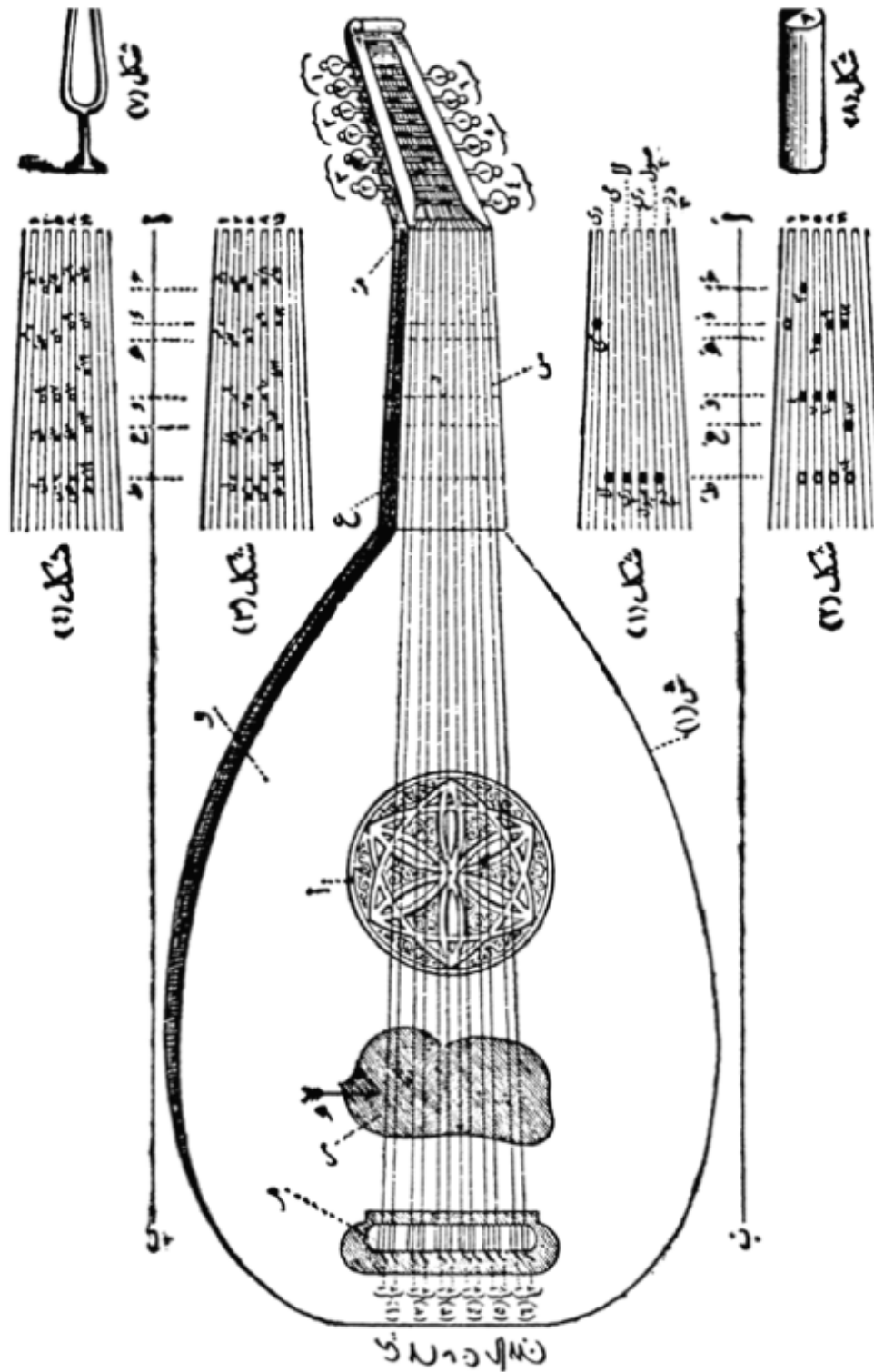


Fig. 2. Reproduction of the drawing of an 'ūd in *Khula'i*, 1904/1905, p. 53.

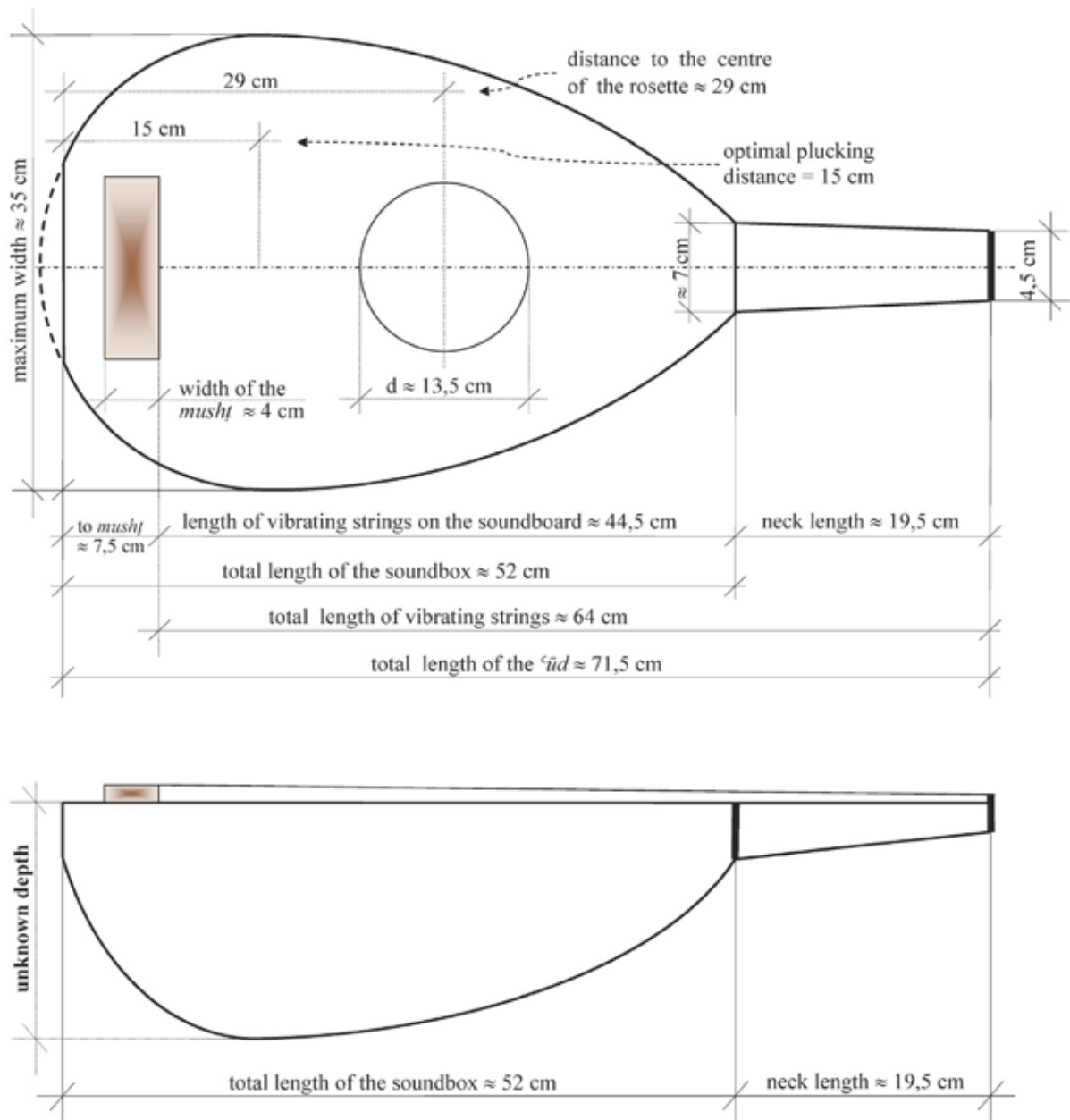


Fig. 3. Revision of the 'ūd described by *Khula'i* (1904-1905). The measurements are those taken from the original drawing²⁴.

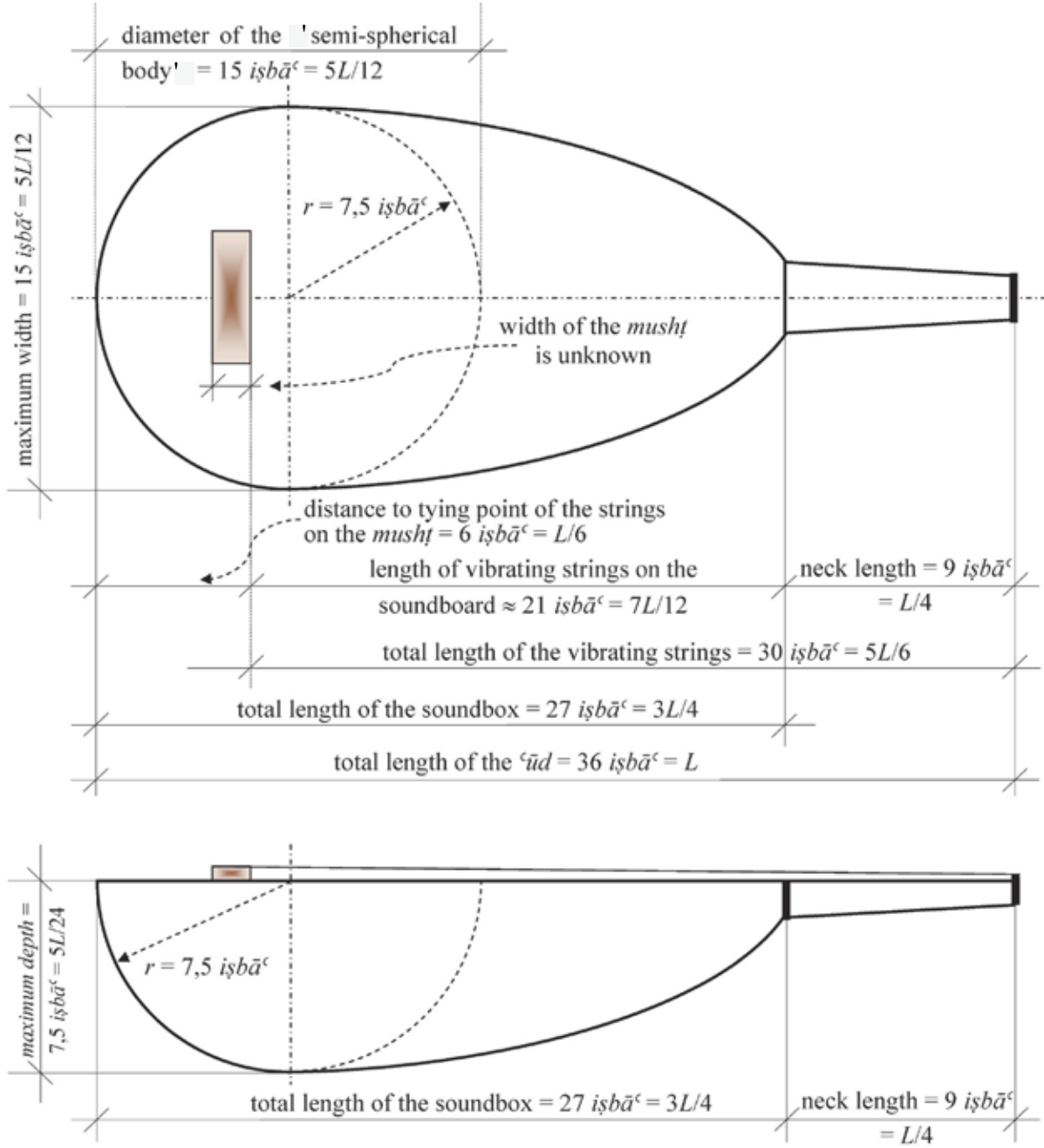


Fig. 4. Drawing of the 'ūd in the *Kanz a-t-Tuḥaf*, 14th century, first hypothesis ²⁸.

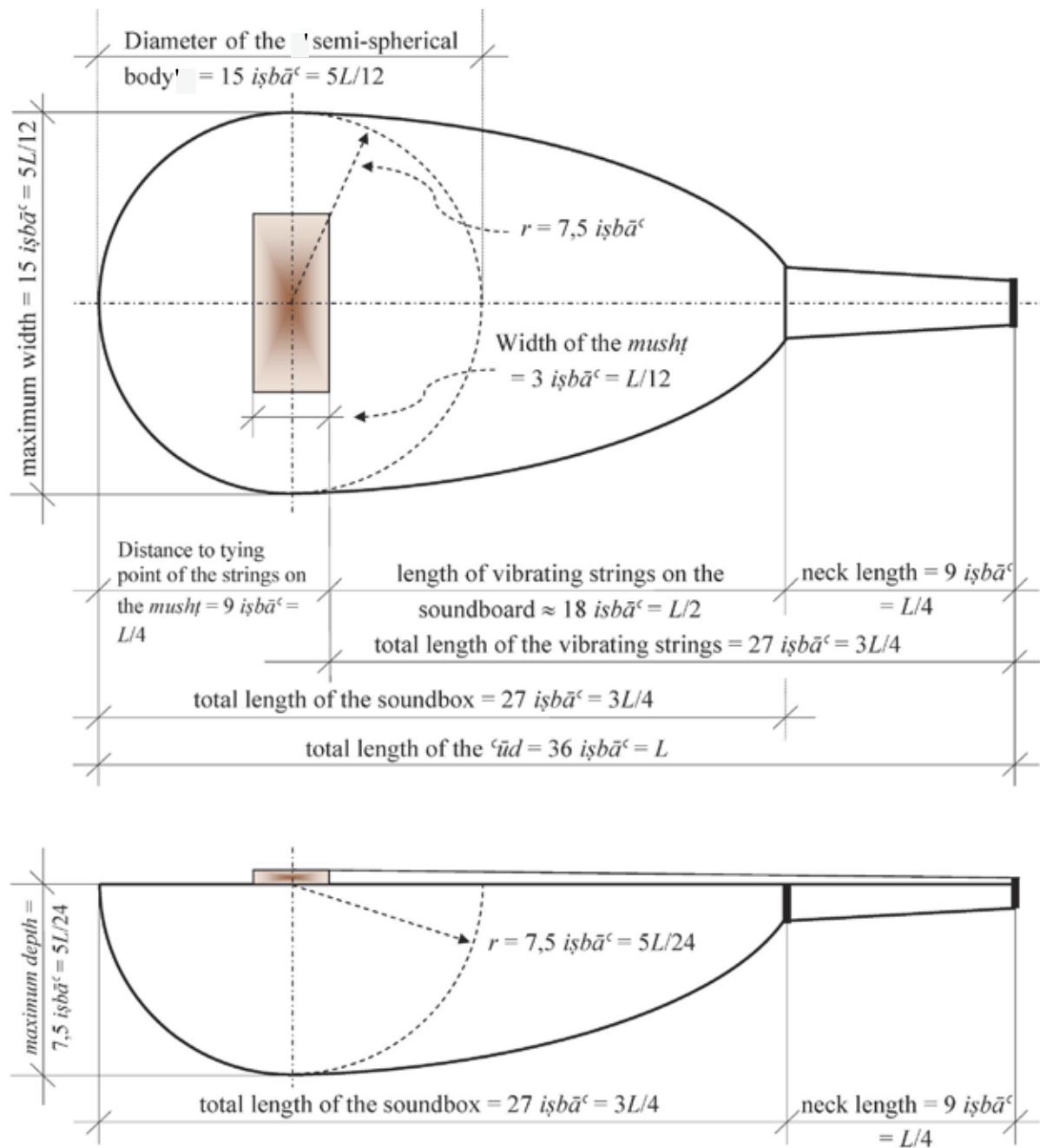


Fig. 5. Drawing of the 'ūd in *Kanz a-t-Tuḥaf*, 14th century? Second hypothesis with oversized bridge.

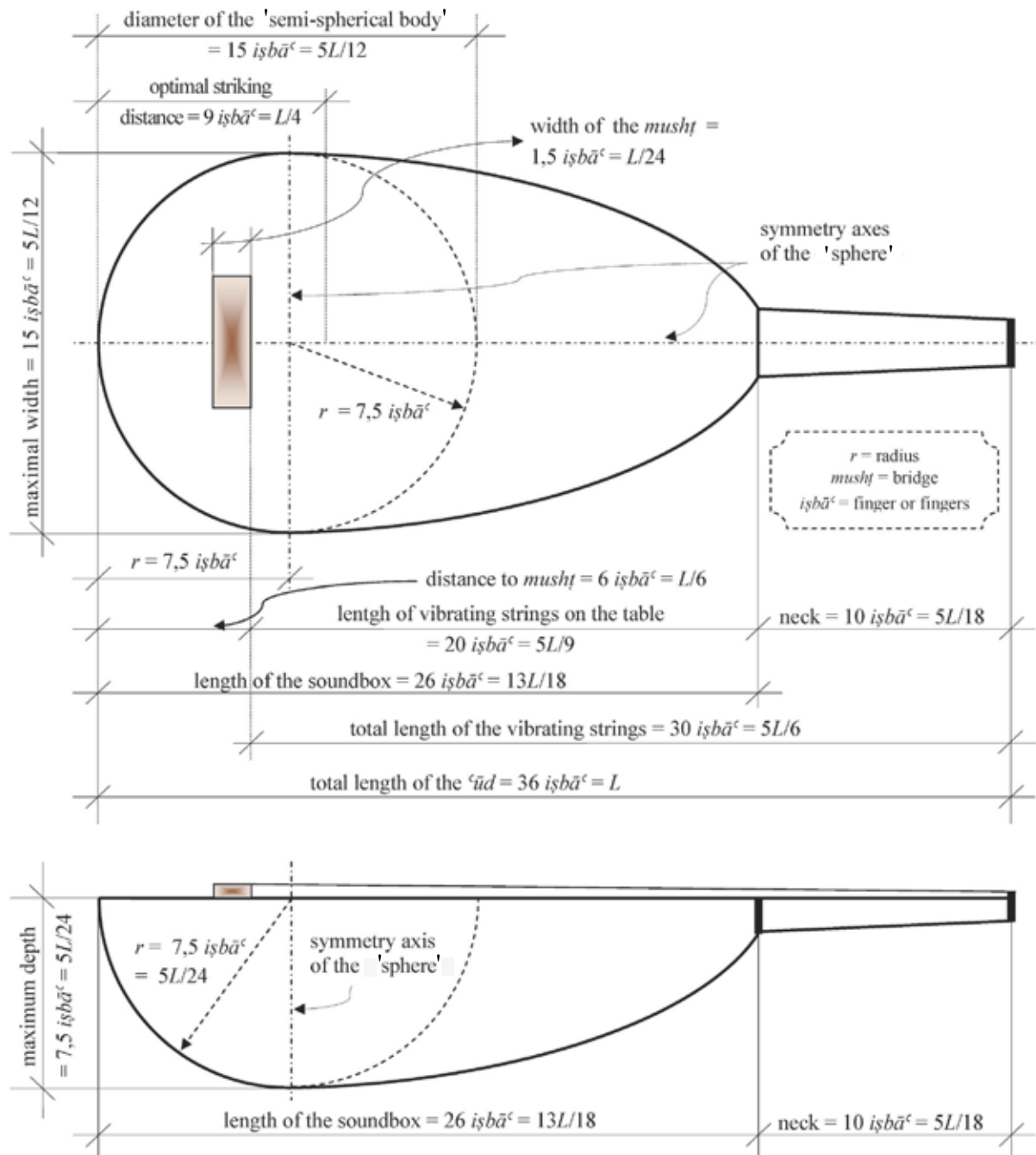


Fig. 6. Drawing of Kindi's 'ūd as described in the *Risāla fī-l-Luhūn wa-n-Nagham*, 9th century; Kindi's description is compatible with a monoxyle box and neck lute, like the Omani *qabbūs* or the Yemenite *qanbūs* (or *qambūs*) - see also figure 2 in Beyhom, Amine: 'Fretage du 'ūd (luth arabe) dans la théorie musicale arabe et influence sur la pratique [The fretting of the 'ūd in Arabian music theory and its interaction with practice]', Fifth Conference on Interdisciplinary Musicology - Music and its instruments, October 2009 <http://cim09.lam.jussieu.fr/CIM09-en/Proceedings.html>, http://cim09.lam.jussieu.fr/CIM09-en/Proceedings_files/Beyhom-Makhlouf.pdf.

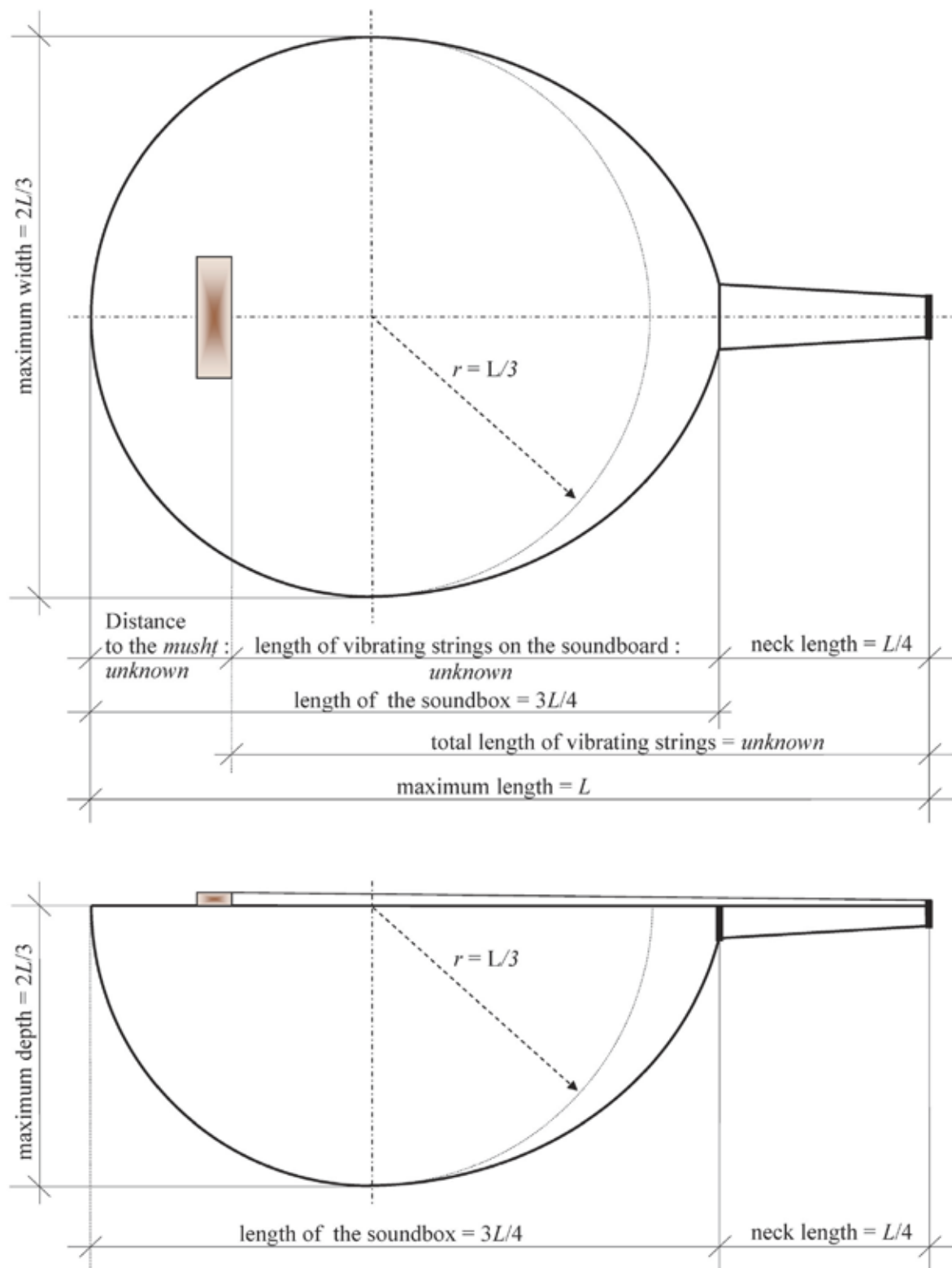


Fig. 7. Drawing of the 'ūd described by the *Ikhwān a-ṣ-Ṣafā'*, 10th century with the hypothesis of an almost circular soundbox⁴⁷.

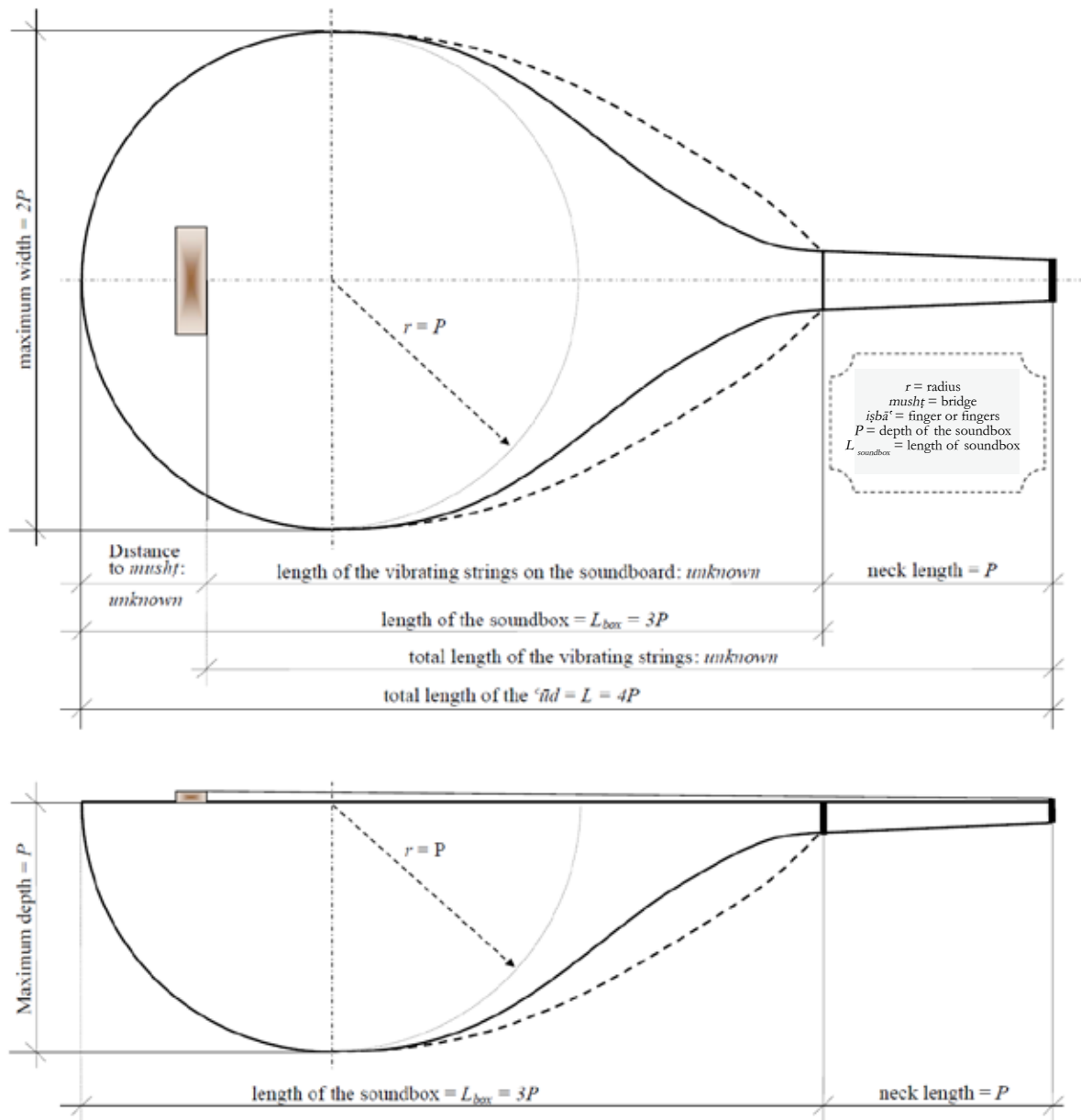


Fig. 8. Drawing of the 'ūd in the *Ikhwān a-ṣ-Ṣafā'* in the hypothesis of 'noble' parts of the sound-box (according to Neubauer). The thick dotted lines show an alternative shape of the box, since the *Ikhwān* have not given indications of lengths, and the speaking length is still unknown, as is the position of the bridge.

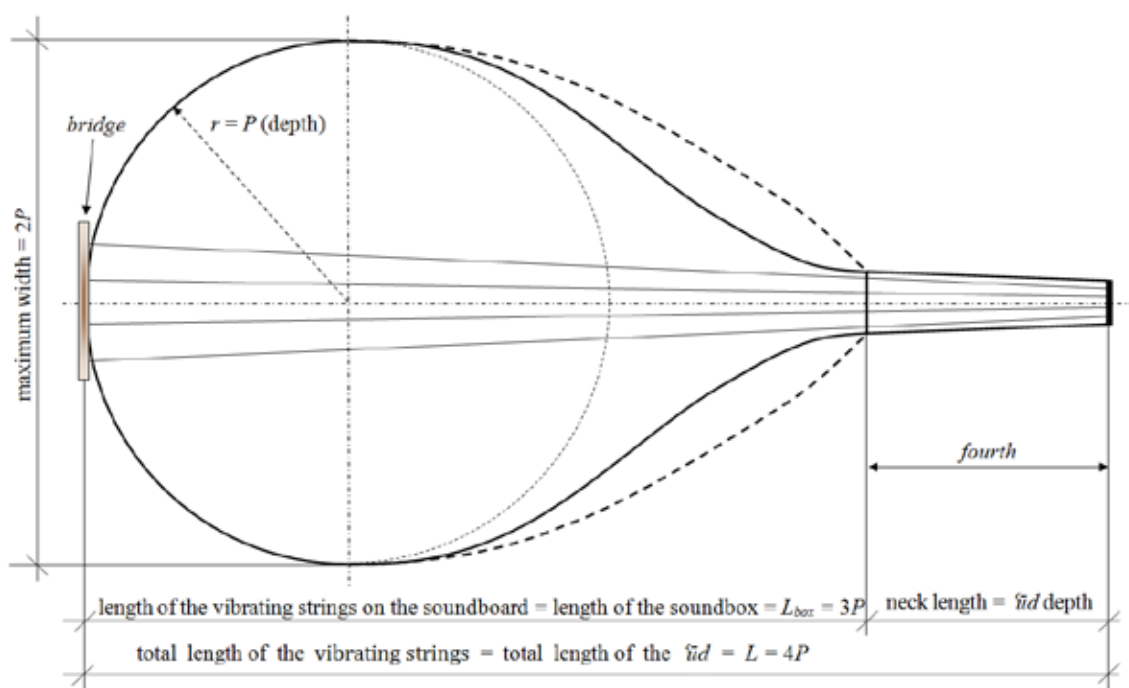


Fig. 9. Drawing of the 'ūd in the Ikhwān a-ṣ-Ṣafā' in the hypothesis of 'noble' proportions of the parts of the box (according to Neubauer), and of the junction between the neck and the box equating to a just fourth. The speaking length become equal to the total length and the bridge-tailpiece is placed right at the bottom of the soundboard.

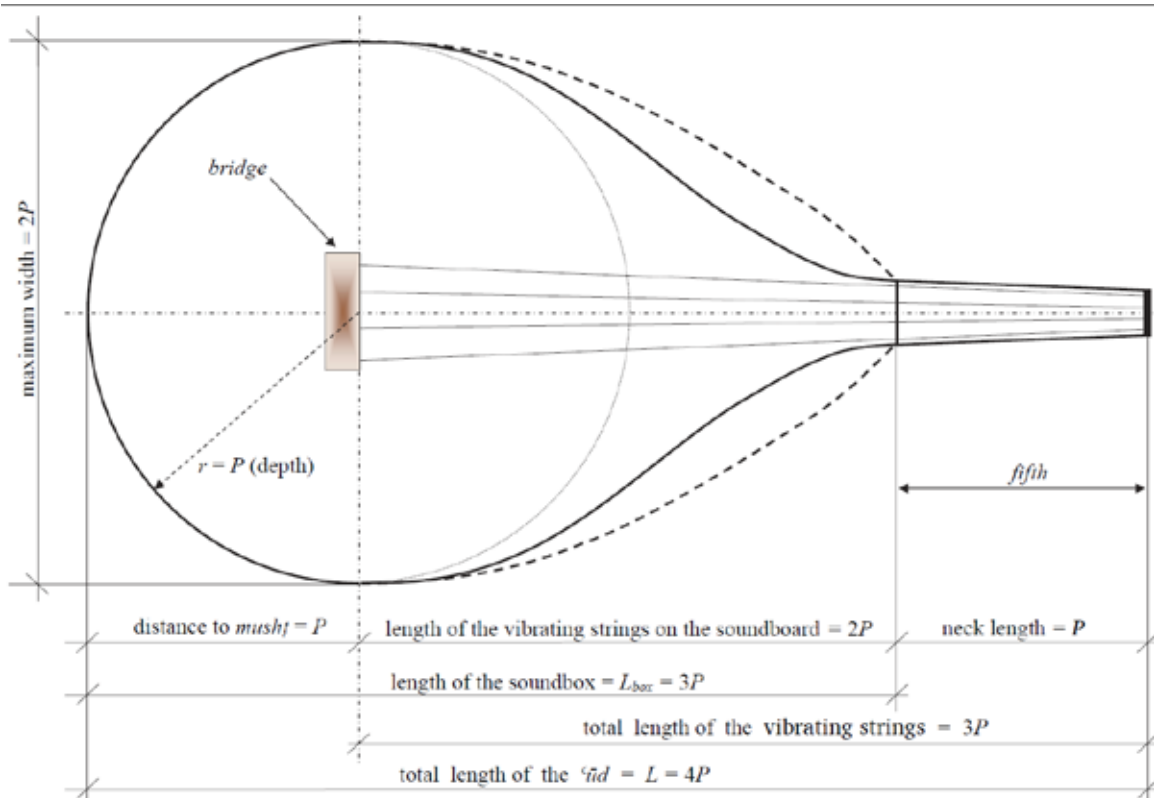


Fig. 10. Drawing of the 'ūd with the Ikhwān a-ṣ-Ṣafā' in the hypothesis of 'noble' proportions of parts of the box (according to Neubauer) and of the junction between neck and sound-box equating to the just fifth. The speaking length equals the length of the box, and the bridge is placed above the deepest of the box.

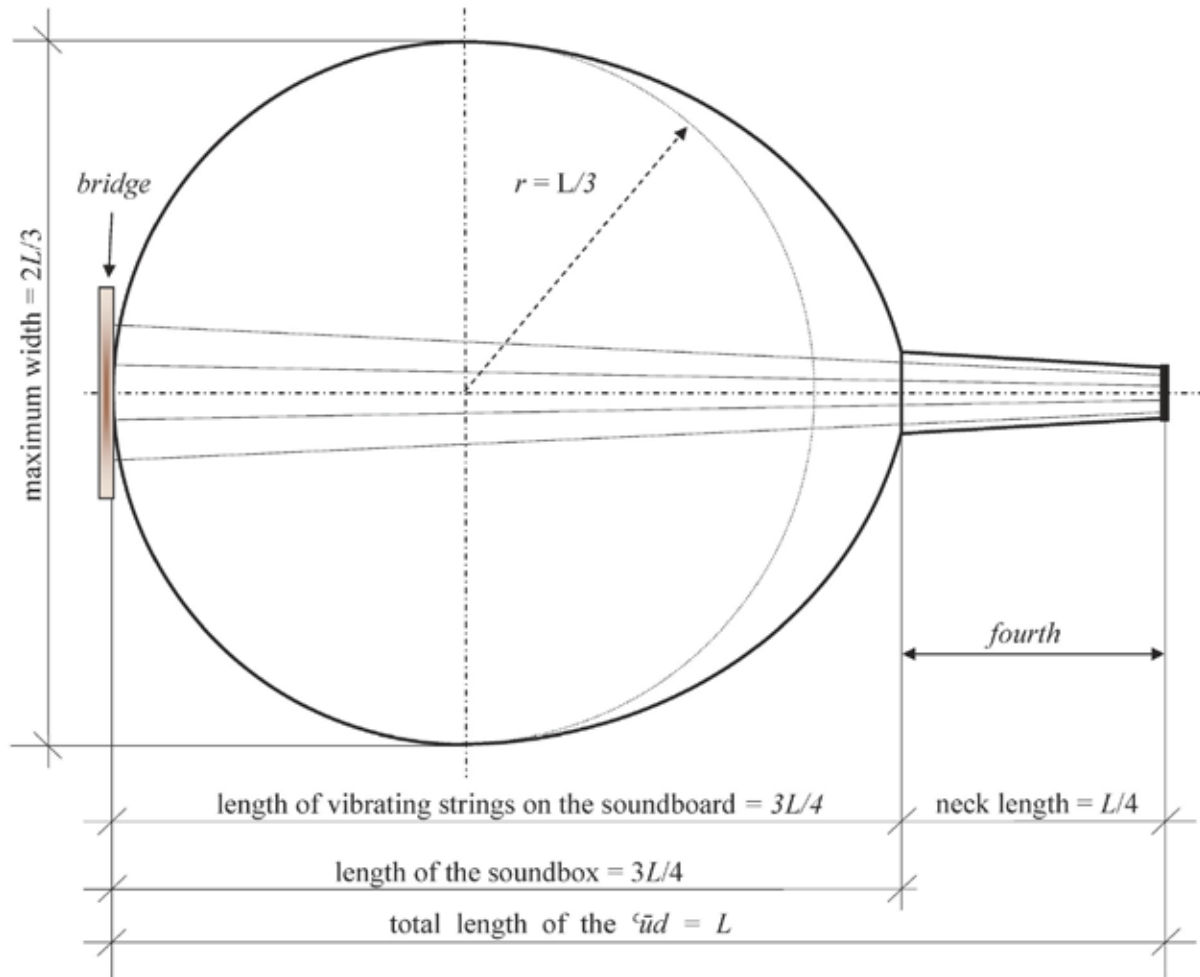


Fig. 11. Drawing of the 'ūd from the *Ikhwān a-ṣ-Ṣafā'* in the hypothesis of 'noble' proportions and of the junction between neck and box equating to the just fourth. The speaking length becomes equal to the total length of the 'ūd' (in relation to Neubauer's interpretation) and the strings are affixed at the base of the box.

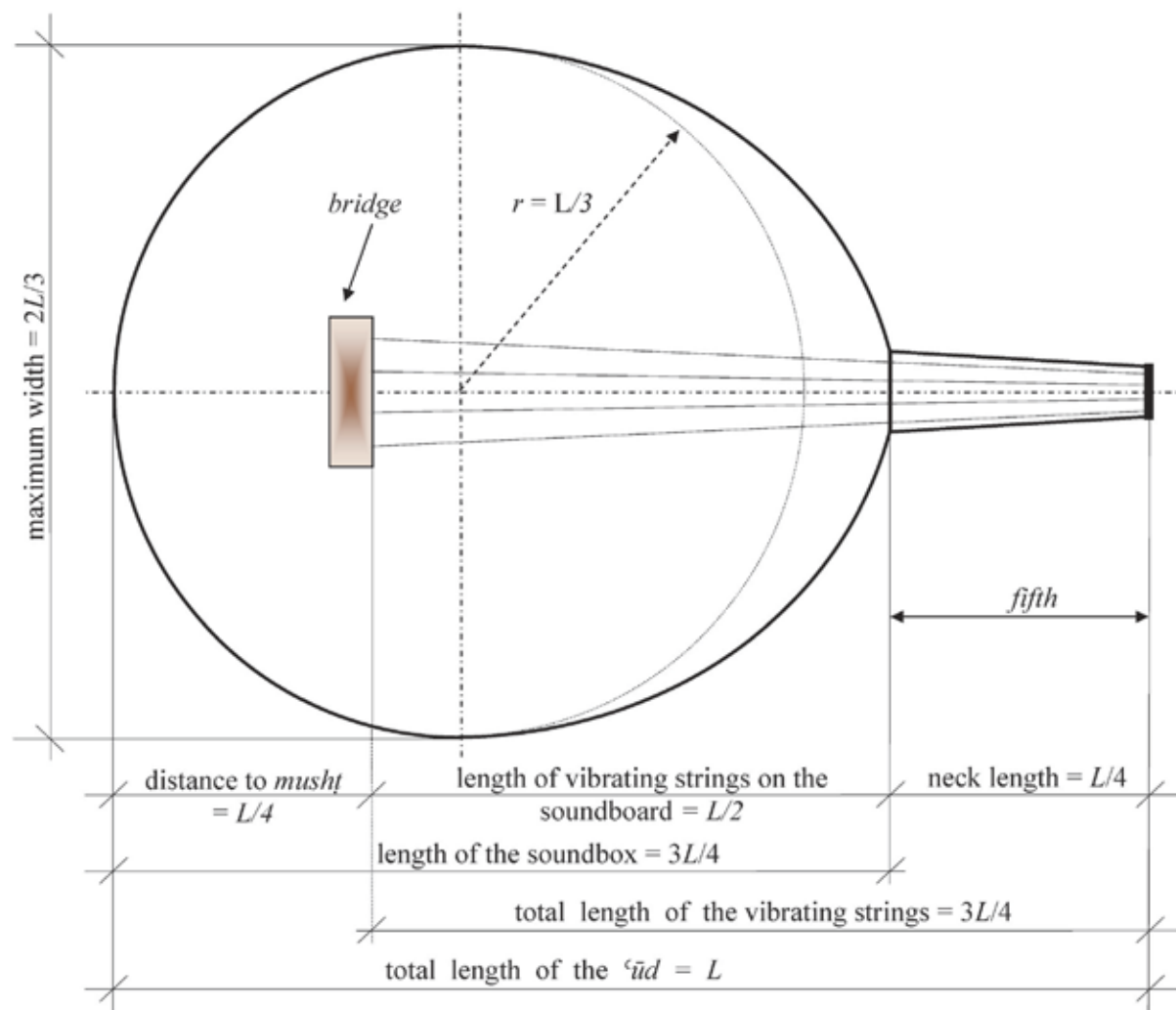


Fig. 12. Drawing of the 'ūd with the *Ikhwān a-ṣ-Ṣafā'* in the hypothesis of 'noble' proportions of the parts of the box (in our interpretation) and the junction between the neck and the box equating to the just fifth. The speaking length equates to $3/4^{\text{th}}$ of the total length of the 'ūd.

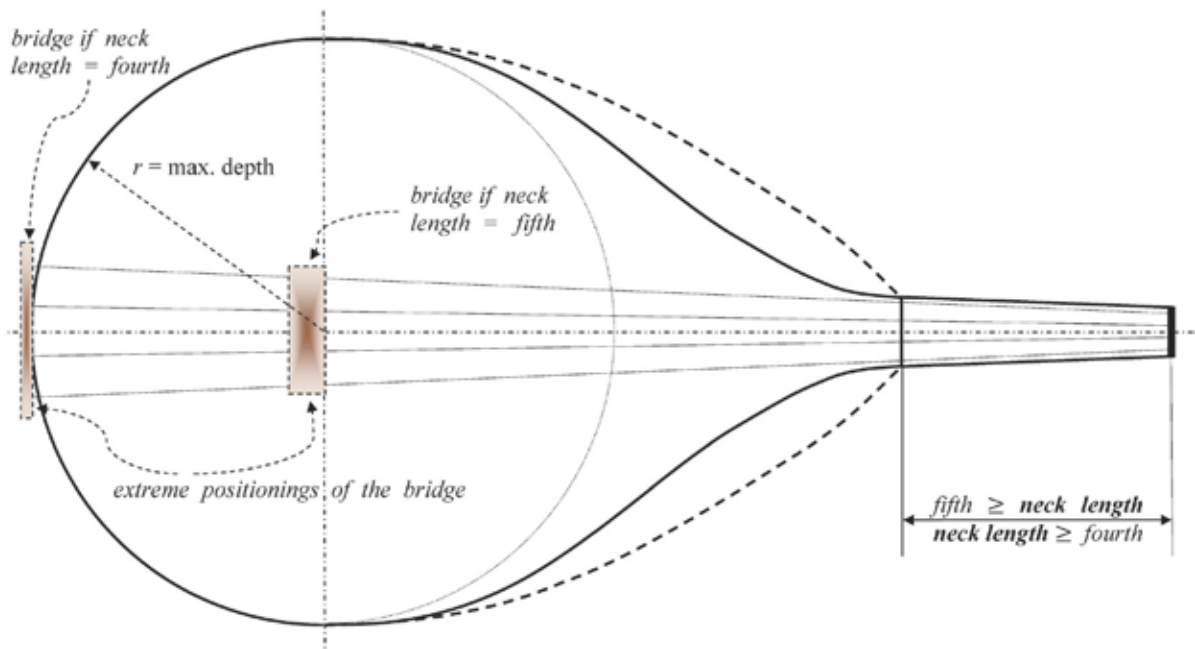


Fig. 13. Drawing of the 'ūd in the *Ikhwān a-ṣ-Ṣafā'* showing the two extreme positions of the bridge, in Neubauer's interpretation.

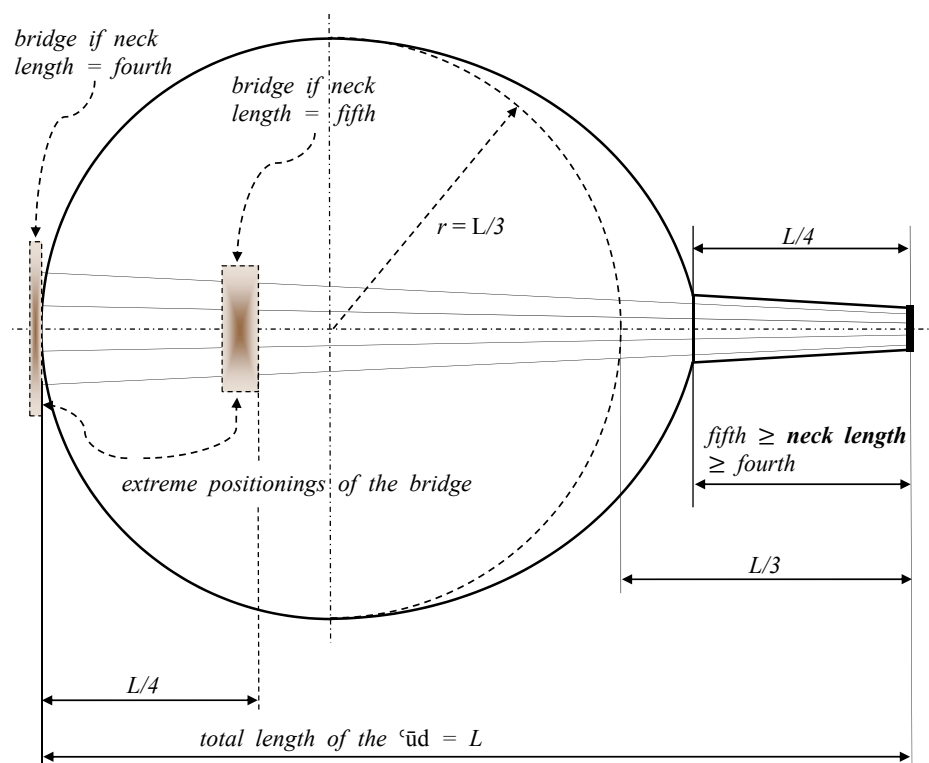


Fig. 14. Drawing of the 'ūd in the *Ikhwān a-ṣ-Ṣafā'* showing the two extreme positions of the bridge in our interpretation.

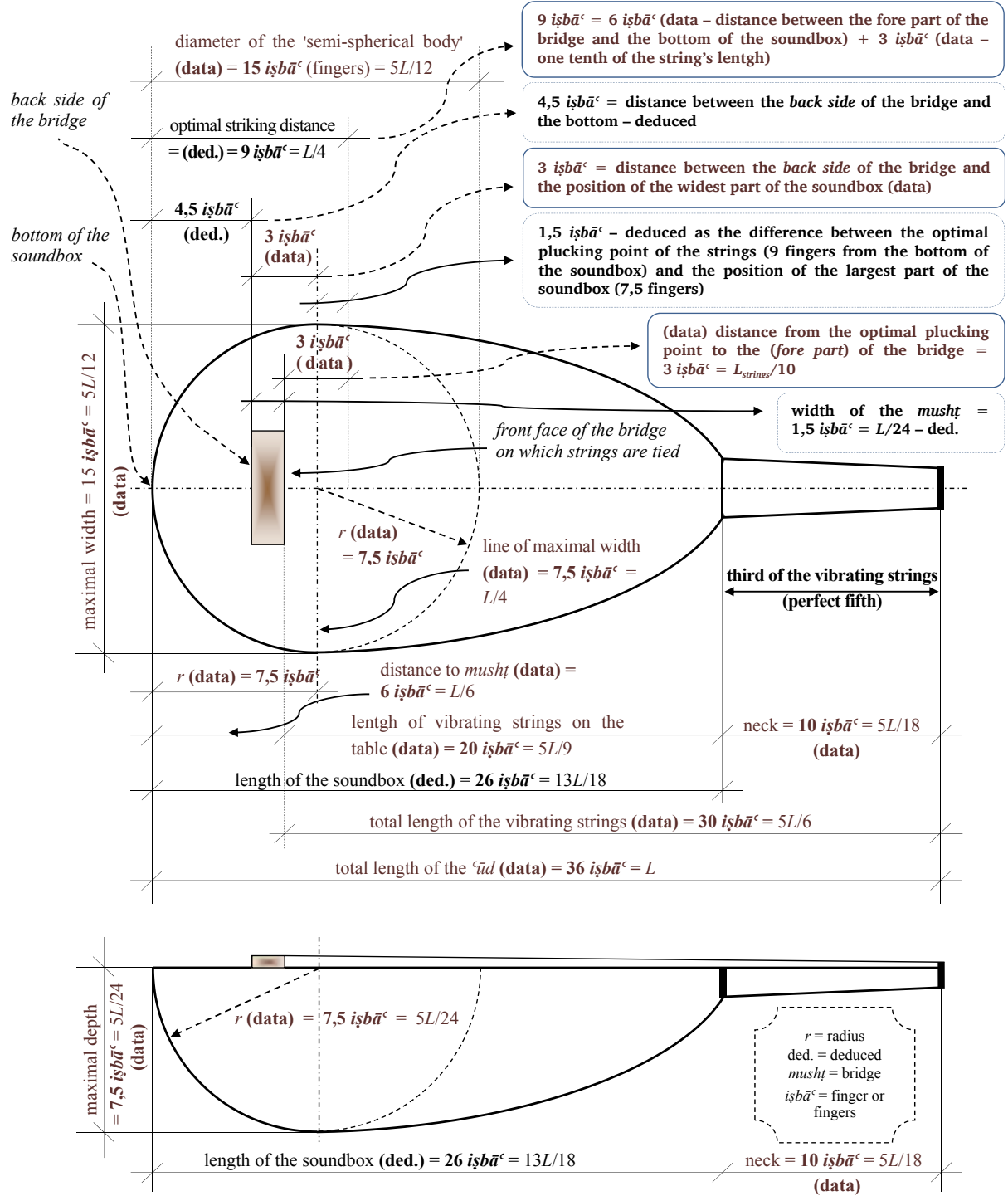


Fig. 15. New drawing of Kindi's 'ūd showing the reasoning determining the plucking point.



Fig. 16. Tracing of an Indian lute of the *Gandhāra*, around 700⁸³.

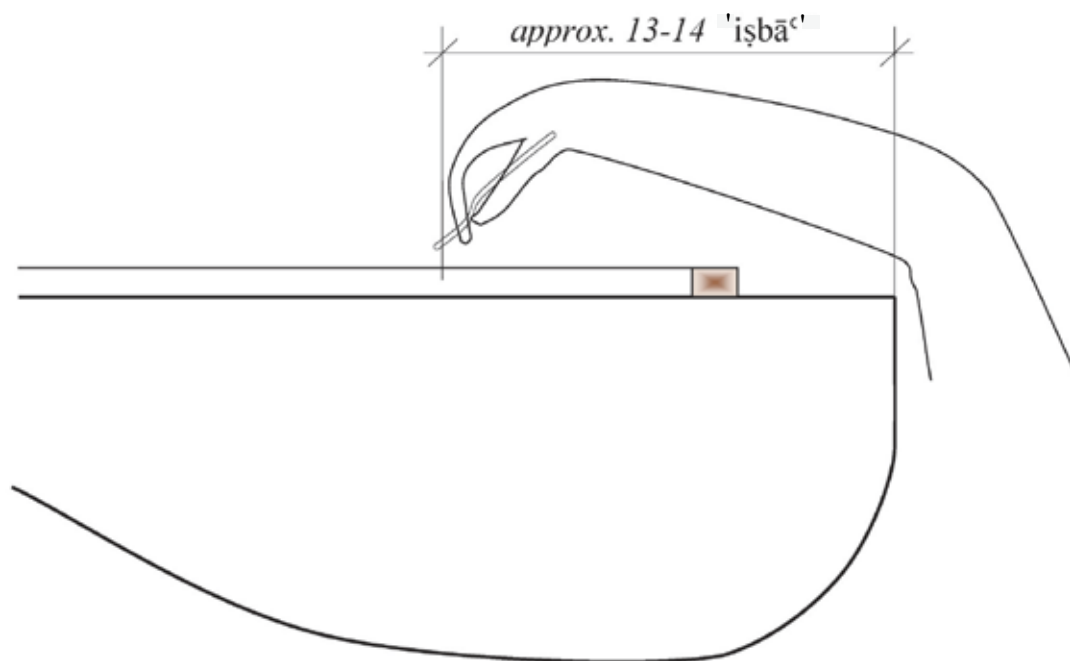


Fig. 17. Stylised representation of the forearm of a musician holding a plectrum in plucking position.

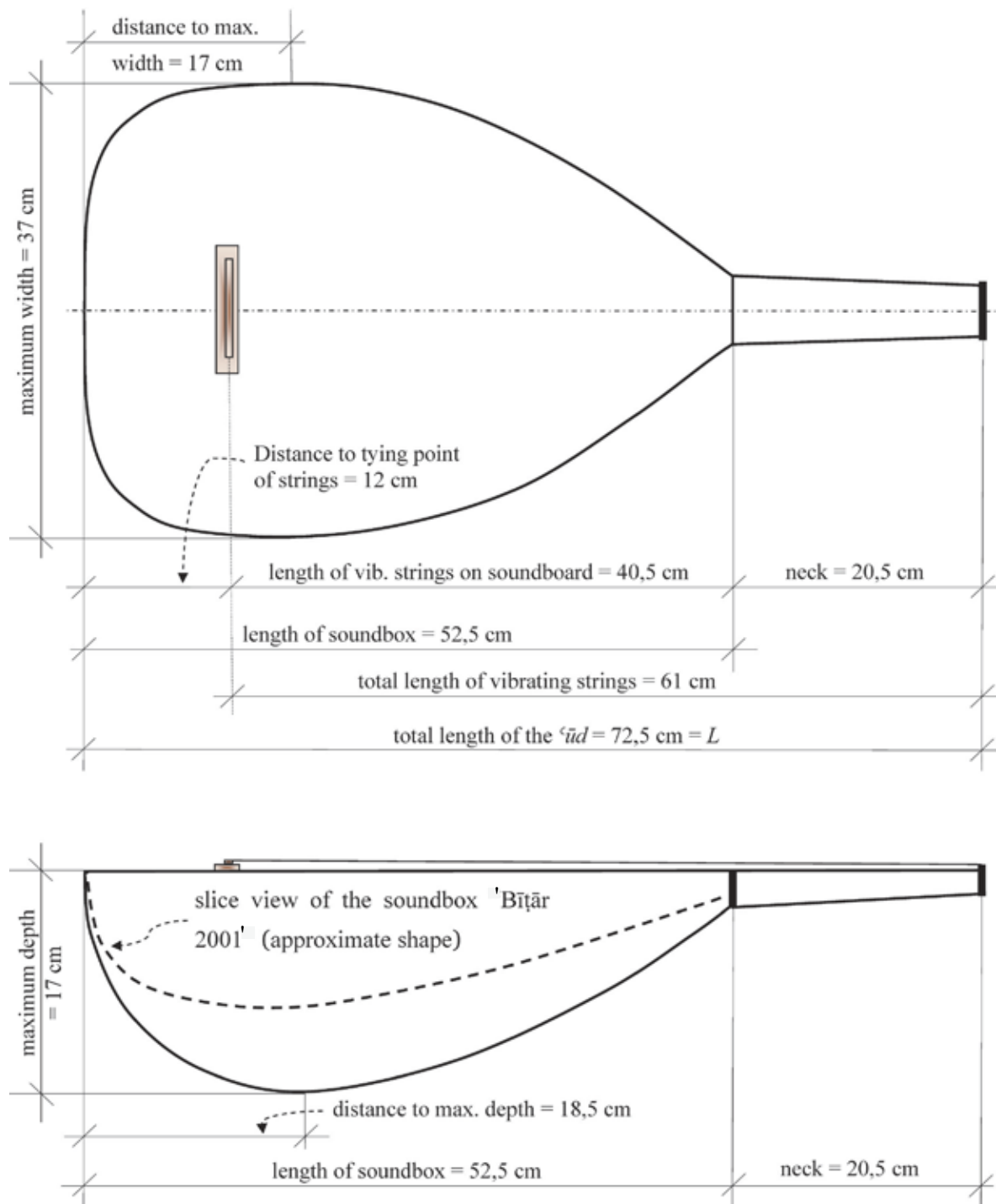


Fig. 18. Drawing of the *Biṭār-Saab 'ūd*. The original instrument was made by the Lebanese luthier Georges *Biṭār* in 2001-2002 for 'ūd teaching purposes at the Lebanese National Conservatory. The transverse-slice view is of the electro-acoustic 'Bīṭār 2001' 'ūd shown in figure 19. The latter is a straight forward adaptation of the physical elements of which the *Biṭār-Saab 'ūd* is composed. No Pythagorean proportion can be seen were it for this instrument or for *Khula'i's* in figures 2 and 3.



Fig. 19. Front and side views of the *Biṭār ūd* with thin box. (*Biṭār* 2001)